6th ANNUAL CARBIDES FEATURE ISSUE

FEBRUARY, 1955

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

OUR 20th ANNIVERSARY YEAR

EDITORIAL: speaking of guarantees . . .

•

TALK OF THE MONTH: How to Shorten the Manufacturing Cycle

•

Trepanning with Carbides

•

High Speed Carbide Notching Dies

•

Fine Finishes on Carbide Surfaces

•

Carbide Grade Selection

•

1954 Titanium Review

•

Drilling Thrusts and Deflections

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BPA

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IN SERVICE, RELIABILITY and QUALITY

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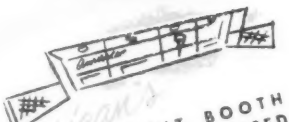
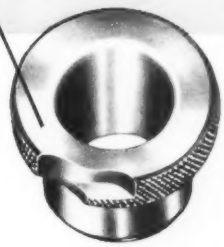


EXHIBIT BOOTH FEATURING ADVANCED

ASTE Booth #873
Western Industrial Exposition
March 14-18, 1955
Los Angeles Shrine Auditorium and Shrine Exposition Hall



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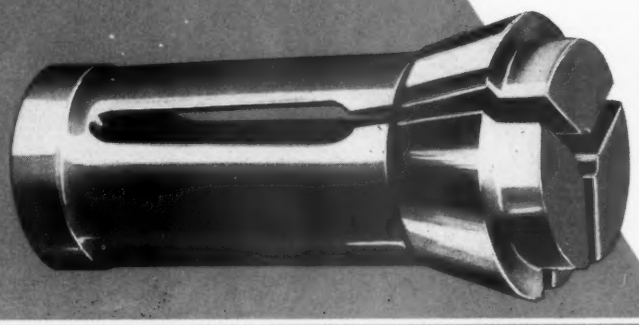
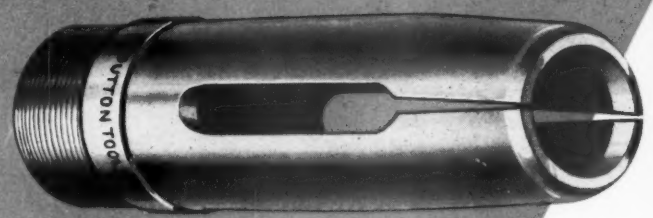
and longer **GRIP** on production

with **SUTTON**





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CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

formerly
Tool-Die-Machine PROGRESS 1934-1941
TOOL & DIE JOURNAL 1941-51

VOL. XX---No. 11 FEBRUARY, 1955

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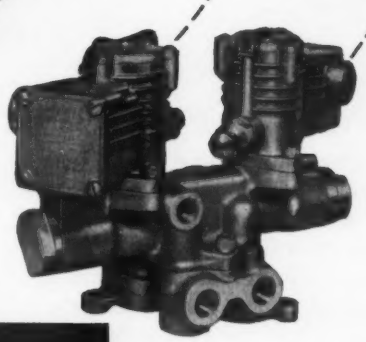
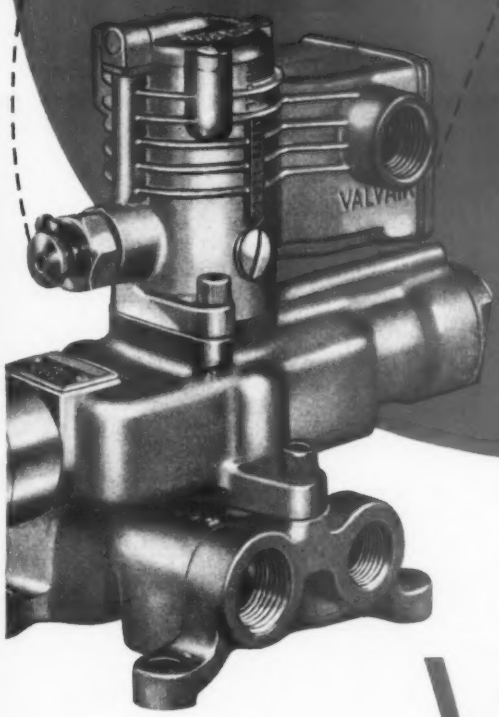
DOUBLE

solenoid
pilot operated
control valve



SPEED KING



Valvair is proud to announce another advancement in the field of automation—The Double Solenoid Speed King Control Valve, designed especially for both the Original Equipment Manufacturer and the End User. This development proves that, more than ever before, Valvair is the name to keep in mind when you order solenoid-operated valves.

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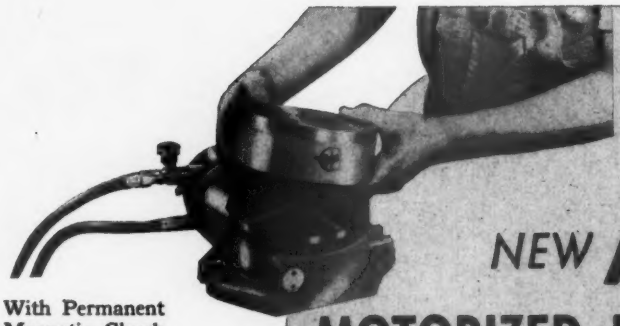
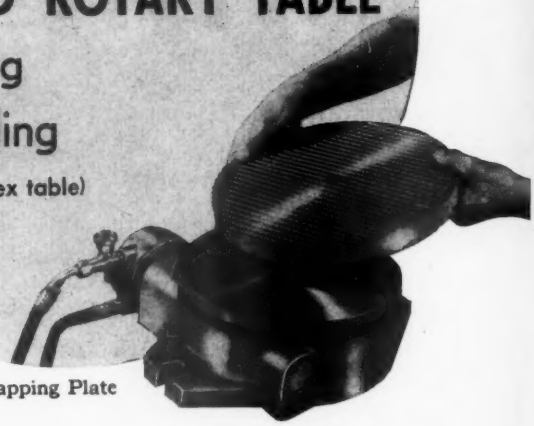


With Permanent Magnetic Chuck

NEW *Vulcan* MOTORIZED ROTARY TABLE

for lapping and grinding

(not an index table)



With Lapping Plate

FASTER
circular precision grinding!

Now with this table and with less effort you assure highest standards of accuracy, flatness, finish and close tolerances. At the same time you eliminate slow and complicated tool setups. You cut grinding time greatly by using only cross feed while the table is rotating at infinite speeds between 40 and 100 RPM.

For example, Vulcan's Rotary Table can be used in connection with a sine plate or angle fixture. The dressing of large expensive external wheels for side grinding is therefore eliminated. If you wish we can provide permanent magnetic chucks designed for use with our table, both 6″ and 10″ in diameter.

Vulcan's Rotary Table is an air operated, self contained unit, portable between bench or machine. A precision center hole for locating and tapped holes in the table for clamping provides easy setup. Circular surface grinder applications are many and varied — grind flanged studs or bushings — bearing spacers — forming rolls — cutters — convex or concave surfaces — punches or dies (radius or angle).

Lapping? Yes — and in micro inches. For the 6″ and 10″ table, lapping plates of 12″ and 16″ are provided. Perfect for lapping valve plates, gages, bearing spacers and for carbide lapping using diamond powder. *Write for circular.*

Work clamped to motorized table, mounted on sine plate. Surface grinder application.

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Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

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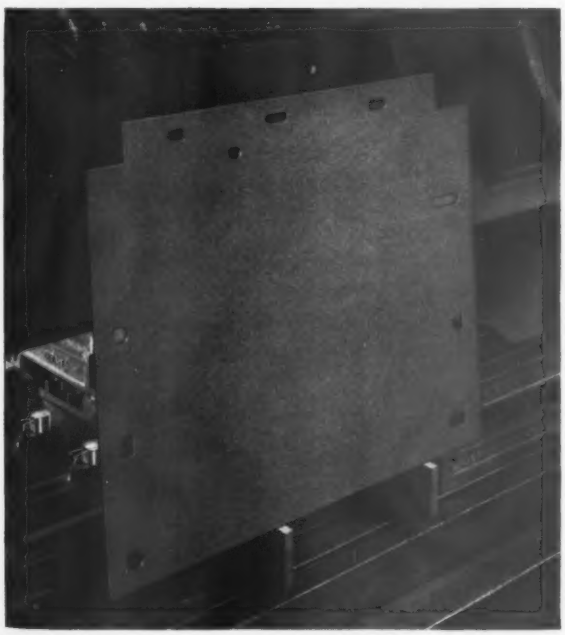
Production....

.....'way out ahead

WALES HOLE PUNCHING & NOTCHING EQUIPMENT



TOP — Wales Type "BL" Hole Punching Units and Wales Type "N" Notching Units in a combination staggered hole punching and notching set-up in a press brake.

BOTTOM — Typical round and shaped holes plus corner notches produced by Wales Type "BL" Hole Punching Units and Type "N" Notching Units in a stamping press.

By providing simpler, faster set-up methods, Wales Hole Punching and Notching Units *insure greater production economies.*

For example, a group of these independent, self-contained Wales Units may be set up for punching and notching to produce parts the same day a pattern is released for production. These "Right-Into-Production" advantages are made possible by proven Wales features:

- Nothing attached to press ram
- Punches and dies always in perfect alignment
- No die set required
- Independent and self-contained
- Set up in press brakes and stamping presses on templates, T-slotted plates or press brake rails
- Uniform shut height requires only one ram adjustment
- Units may be used in unlimited set-ups eliminating "dead storage"

Before putting holes and notches in angles, channels, extrusions and sheets by *any* method, have the Wales facts at your finger tips. Write today for your personal copy of Wales BL catalog.

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George F. Wales, Chairman

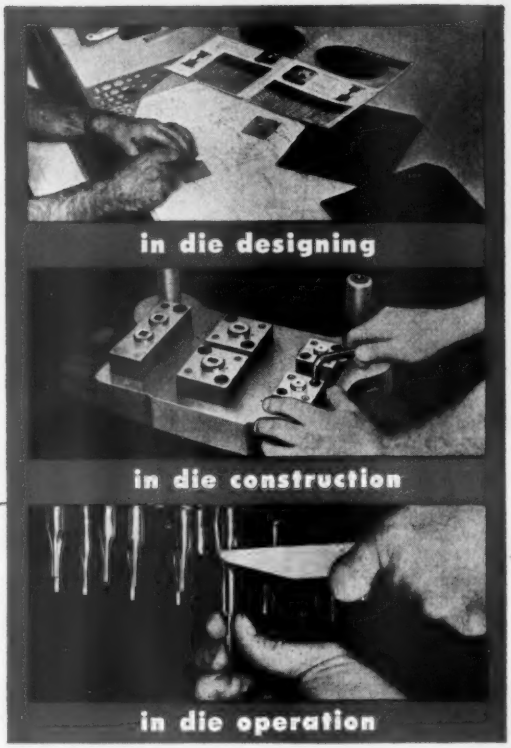
355 Payne Avenue, North Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

Wales-Strippit of Canada, Ltd., Hamilton, Ontario

Specialists in Punching and Notching Equipment

WHERE R-B Punches cut your costs



IN DIE DESIGNING

. . . you save "board time" by working with the standardized R-B concept of punches, die buttons, punch retainers and die button retainers. R-B standardized equipment reduces drafting time to cut your costs.

IN DIE CONSTRUCTION

. . . you save "building time" because R-B punches, die buttons, punch retainers and die button retainers are furnished completely finished. R-B saves skilled die-maker's time to cut your costs.

IN DIE OPERATION

. . . you save "press time" because R-B punches and die buttons are instantly removed and replacements quickly inserted. Inherent accurate alignment and positive locking keep press down-time at a minimum to cut your costs.

Use R-B Engineering Service for Your Tough Piercing Problems.

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ALLIED PRODUCTS CORPORATION
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SPECIAL COLD FORGED PARTS
STANDARD CAP SCREWS
PRECISION GROUND PARTS
SHEET METAL DIES MADE OF FERROUS ALLOYS, ZINC ALLOYS OR PLASTICS

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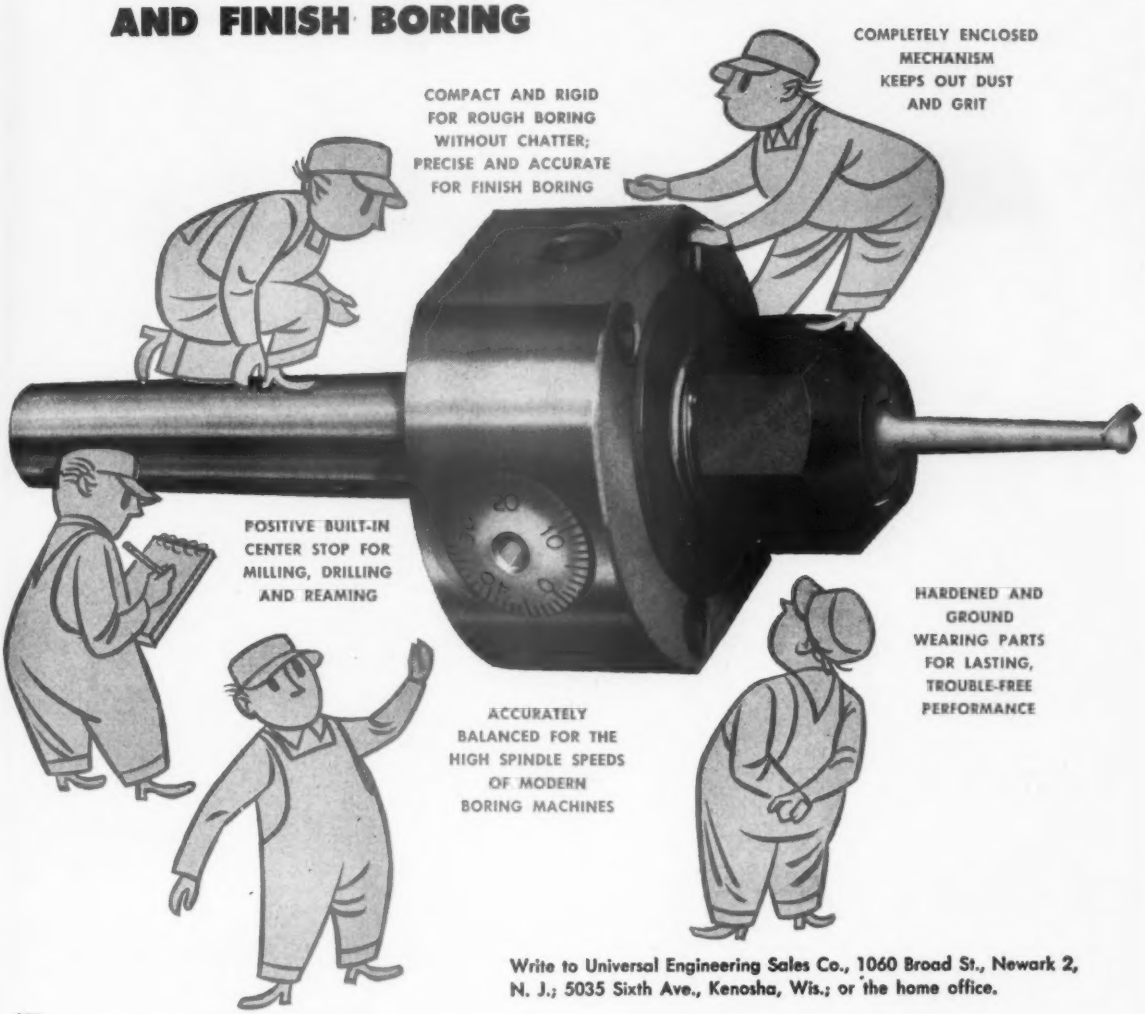
UNIVERSAL BORING CHUCKS

FOR ALL TYPES OF ROUGH AND FINISH BORING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COMPACT AND RIGID FOR ROUGH BORING WITHOUT CHATTER; PRECISE AND ACCURATE FOR FINISH BORING
POSITIVE BUILT-IN CENTER STOP FOR MILLING, DRILLING AND REAMING
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HARDENED AND GROUND WEARING PARTS FOR LASTING, TROUBLE-FREE PERFORMANCE

Write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

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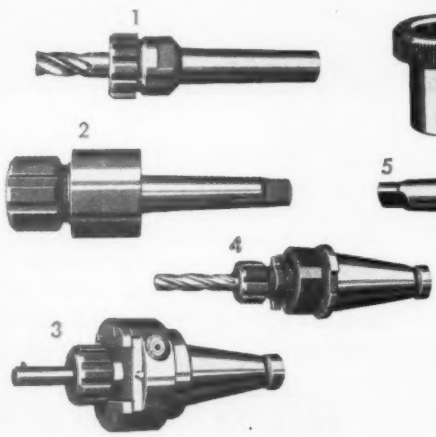
UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 8, MICHIGAN



1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER

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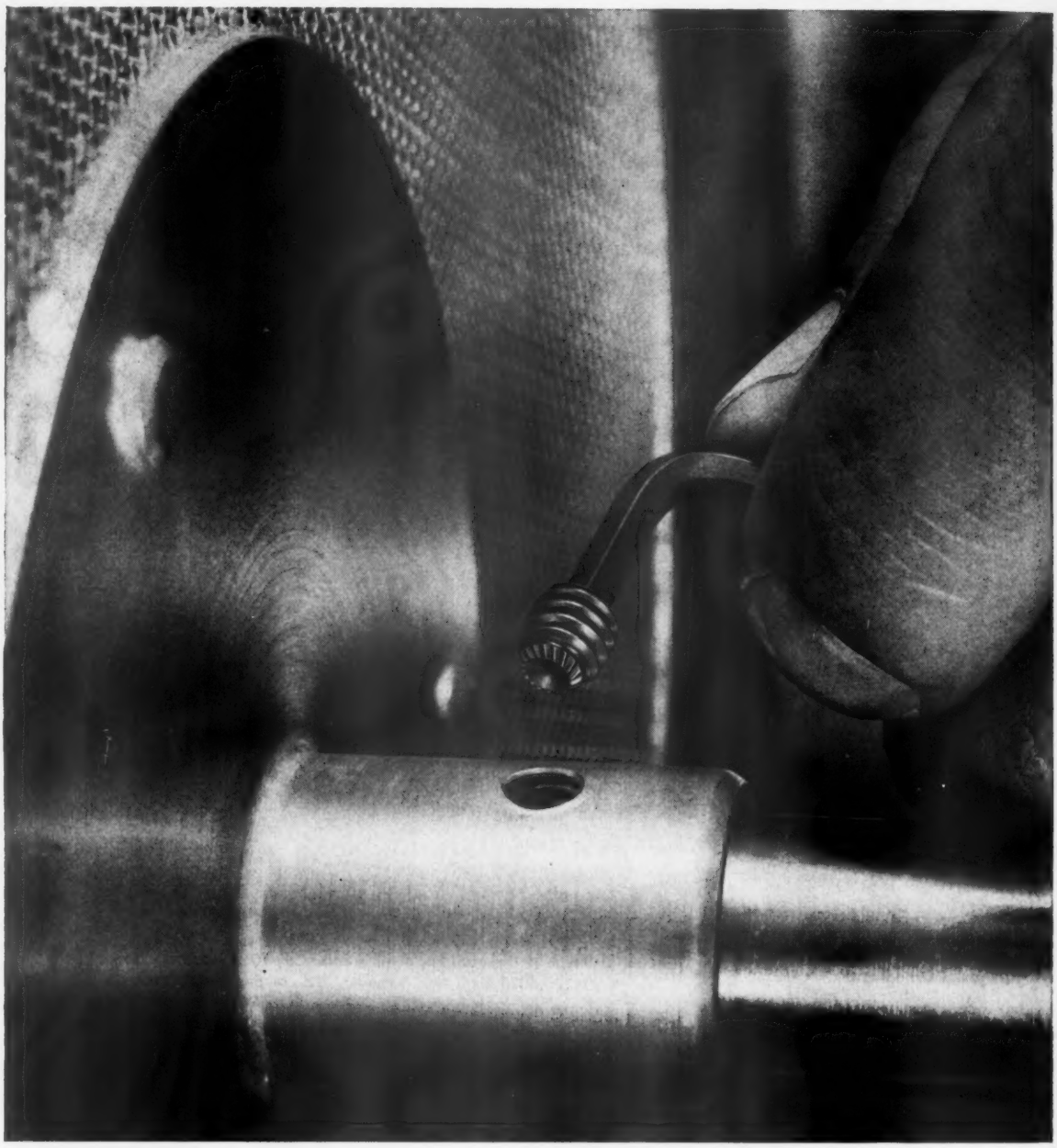
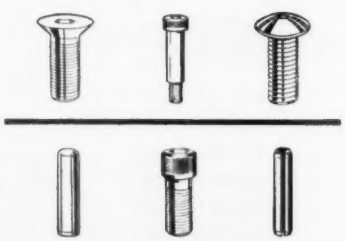
UNBRAKO AT WORK





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UNBRAKO® SOCKET SCREW DIVISION SPS JENKINTOWN, PENNSYLVANIA

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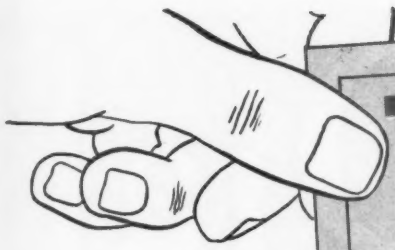
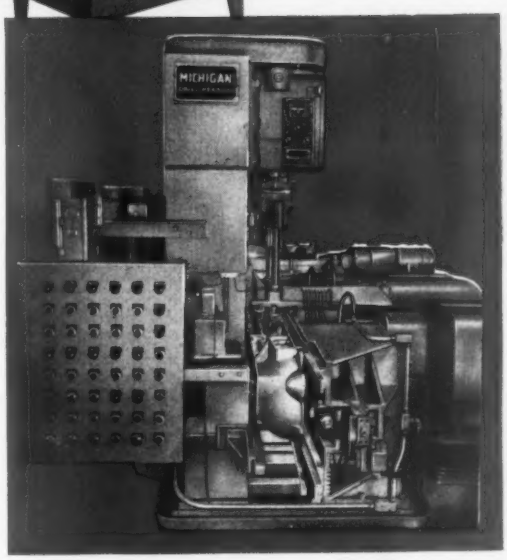


TRANSFER MACHINE
by MICHIGAN DRILL

COMPLETELY AUTOMATIC



FOR DRILLING, CHAMFERING, TAPPING, ROUGH BORING—FINISH BORING

Shown is Four Double End Machine with a transfer System moving Torque Converter Housing automatically through the machine. In addition the part is laid on a roller conveyor after all the machining operations are completed. Machine is designed in such a manner that additional stations can be added at any time. The part, when placed in the transfer track, makes a limit switch and the cycle is automatic.

for faster, More Economical Production

Michigan DRILL HEAD CO. Detroit 34, Michigan

engineers and manufacturers of production machines and drilling equipment

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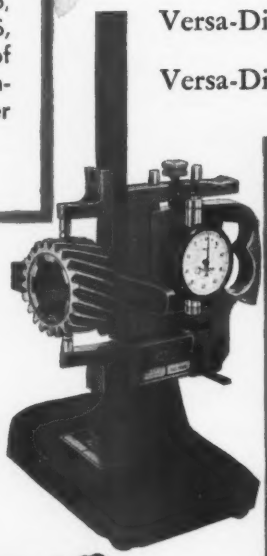
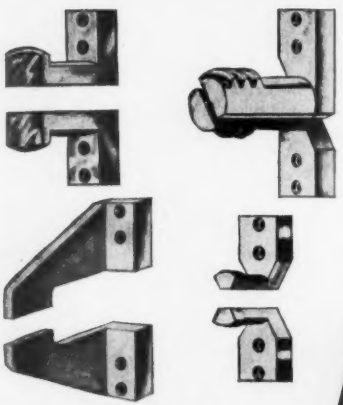
Interchangeable segments permit checking of THREADS for over-all fit, pitch diameter, or lead. Gears for pitch diameter or tooth spacing; also GROOVES, shallow COUNTERBORES, narrow SHOULDERS, BLIND HOLES, etc. . . . an almost unlimited variety of work. The VERSA-DIAL can be converted from one type of job to another in moments.

PATENT PENDING

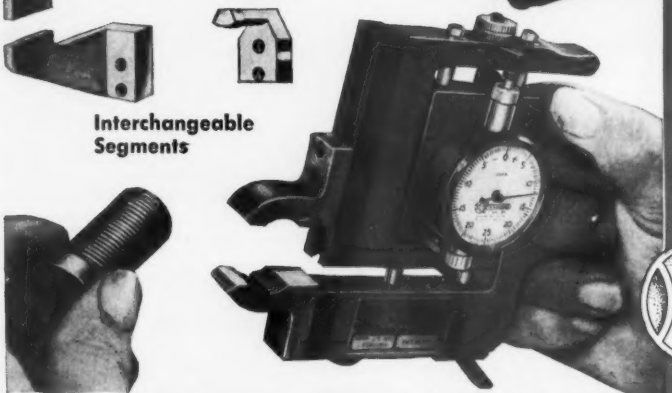
Versa-Dial **INTERNAL THREAD COMPARATOR**

Versa-Dial **HELICAL GEAR PD COMPARATOR**
mounted on bench stand





Interchangeable Segments



Versa-Dial **EXTERNAL THREAD COMPARATOR**

VERSA-DIAL FEATURES

★ **EXTREMELY VERSATILE;** good for almost any job

★ **EXCEPTIONALLY WIDE RANGE** up to 7" or more

★ **QUICK AND EASY TO SET-UP** for long or short runs

★ **RAPID LOADING;** easy to operate

★ **LONG LIFE;** minimum contact wear

Segments are secured in T-Slots at desired spacing . . . movable segment actuates dial indicator, giving direct reading of variations from basic size. Movement is straight; unusually smooth and precise . . . ideal for gaging.

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Poughkeepsie N.Y.

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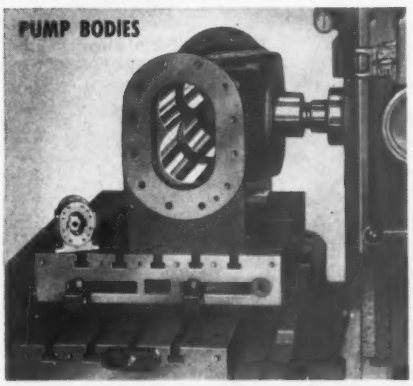
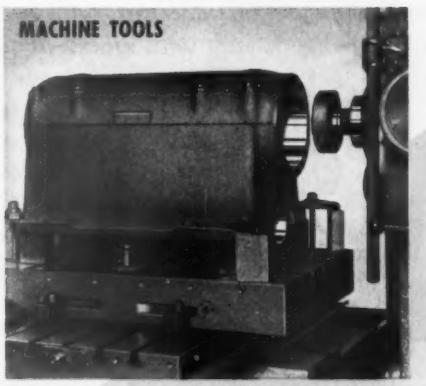
The De Vlieg System of

*JIGLESS PRODUCTION

. . . eliminates expensive boring jigs!

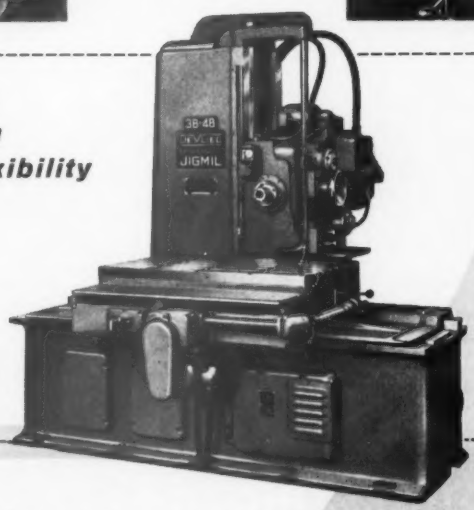




TYPICAL EXAMPLES OF JIGLESS PRODUCTION ON DE VLIEG JIGMILS

The JIGMIL Technique:

- ELIMINATES SPECIAL BORING JIGS
- REDUCES MACHINING TIMES
- PERMITS USE OF SIMPLIFIED TOOLING
- IMPROVES ACCURACY WITH RESULTANT CUT IN ASSEMBLY COSTS



The De Vlieg System of Jigless Production permits complete flexibility of product design!

If your shop is burdened with costly boring jigs and special tooling, it will pay you to investigate the

DE VLIEG *SPIRAMATIC* JIGMIL

**Come to Detroit—*

see a practical demonstration of the JIGMIL TECHNIQUE

Write for comprehensive Illustrated Catalog

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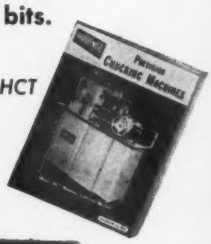
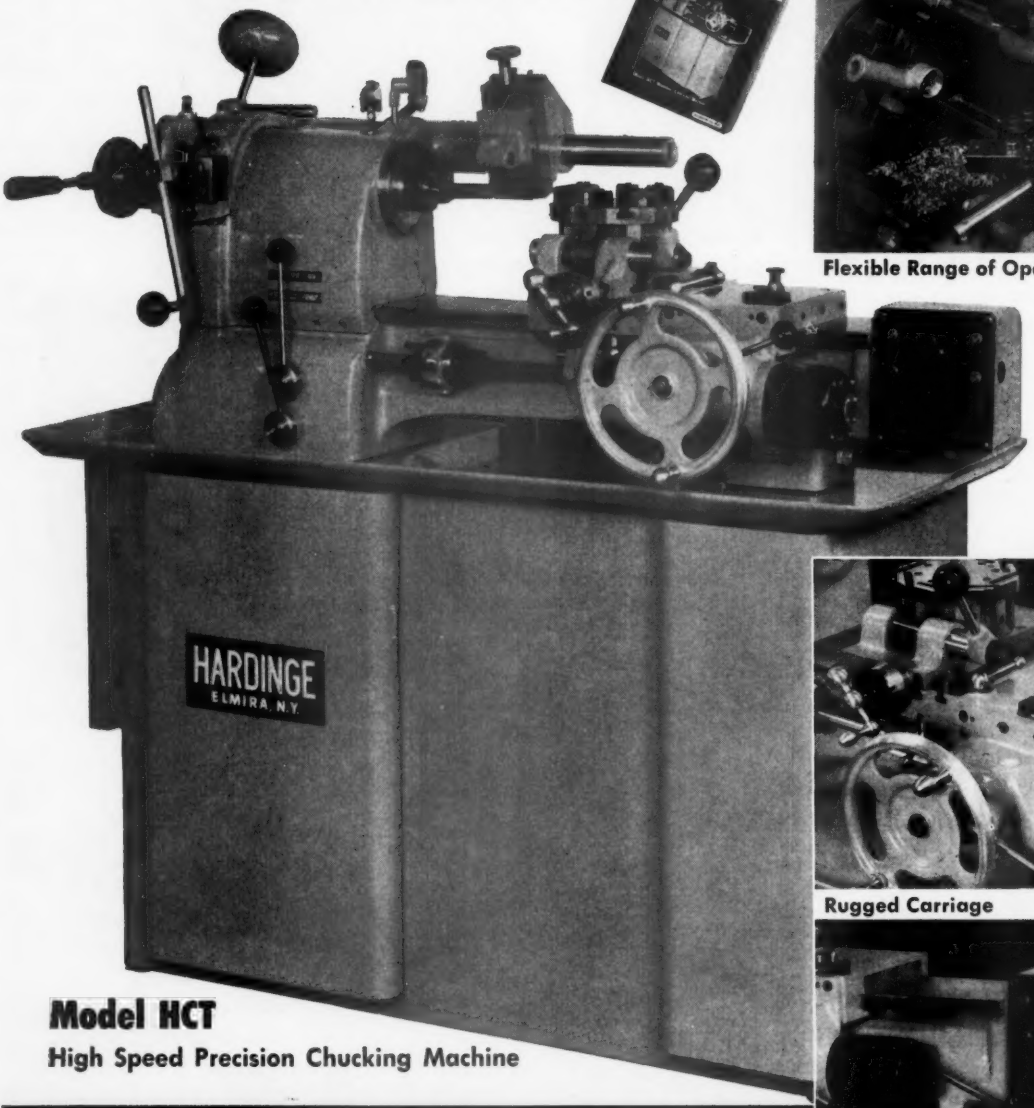
HARDINGE
ELMIRA, N.Y.

PRODUCTION
With Tool Room Accuracy

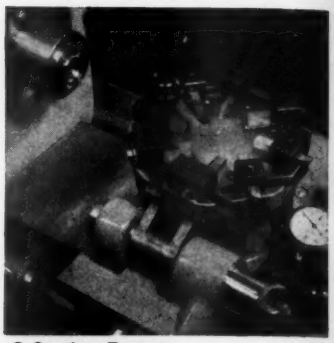
Hardinge Precision Chucking Machine HCT finish diameters, recesses, shoulders, back faces, front faces, and cuts precision threads in *one setting — all concentric* with each other. Tooled inexpensively with standard tool bits.

For complete information write for Bulletin HCT



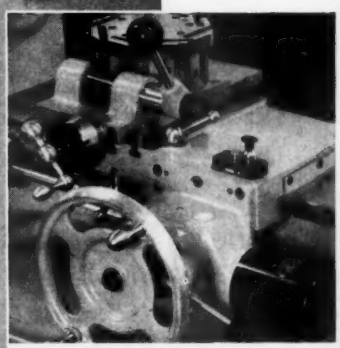


Model HCT
High Speed Precision Chucking Machine



8-Station Turret

Flexible Range of Operation



Rugged Carriage

Independent Variable Carriage Feed

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York 12, N. Y.
CIRCLE INFORM-A-GRAM KEY NO. 14

A MILE OR A SLICE
of tool steel for you
IS IMPORTANT TO MILNE

Milne's favorite orders come in three sizes . . . small, medium and large. Across the continent, Milne has 40 saws cutting tool steel to your order, whether it's in pounds or tons.

And wherever you are, a Milne man is near you. There are 38 Milne tool steel specialists strategically placed to help you with tool steel problems and expedite your order.

Big or little, your order gets the maximum in Milne service.

ORDER
AMCOH Hollow die - Annealed - Spray Painted PINK for identification
1 Pc. 6" OD x 3" ID x 2" Long - 14 lbs.
ORDERED: 11/18/53 10 A.M.
SHIPPED: 11/18/53 2:45 P.M.
SHIPPED BY: Truck

ROUNDS

SQUARES

FLATS

HOLLOW (Tubular)

Wide range of sizes and grades in WATER HARDENING—NON-DEFORMING—SHOCK-RESISTING—HOT WORK AND HIGH SPEED TOOL STEELS

All full length Kolorkoted for permanent identification

Write or call for Milne's Tool Steel Selector.

AM-28

WAREHOUSES	SALES OFFICES	SALES AGENTS		
NEW YORK	DETROIT	TAYLER-SPOTSWOOD OF CAL. LOS ANGELES	SEYFFERT-LANE, INC. DENVER	SANDERSON-NEWBOULD, LTD. MONTREAL-TORONTO
CHICAGO	ROCHESTER			
BOSTON	ST. LOUIS	PACIFIC MACH. & TOOL STEEL CO. PORTLAND, OREGON		
NEW BRITAIN, CONN.	BRIDGEPORT			
PHILADELPHIA	LOUISVILLE	MAXWELL STEEL CO. INC. FORT WORTH, TEXAS		
PITTSBURGH	WORCESTER			
CLEVELAND	MILWAUKEE	D. A. JACKSON, INC. SALT LAKE CITY		
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Complete line of tool steels . . . Wide range of grades and sizes.

A. MILNE & CO.
Established 1887
745 WASHINGTON ST., NEW YORK 14, N.Y.
America's Leading Tool Steel Specialists
Complete Line Of Tool Steels—Hollow and Solid

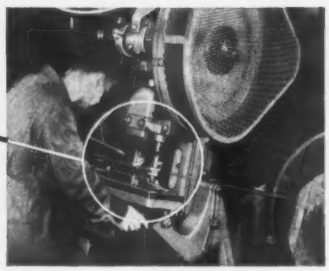
CIRCLE INFORM-A-GRAM KEY NO. 15

money saving

Accessories for your plant

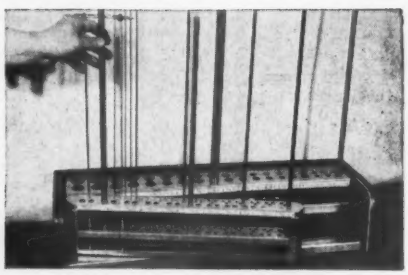
Each of the accessories illustrated and described below was designed and built for a definite need and used in our own plant before being offered to industry. They require a relatively small investment, yet will save you money every day. For further information, write for the folder offered below.

LEADER PIN OILERS



Eliminate wear on your die sets with these leader pin oilers. Acro Pin Oilers, as illustrated, fit over each leader pin and seals in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminate bushing wear, leader pin scoring, and maintain die accuracy. Die sets equipped with Acro Pin Oilers have run under tests for several weeks to a month without refilling.

DRILL ROD RACKS

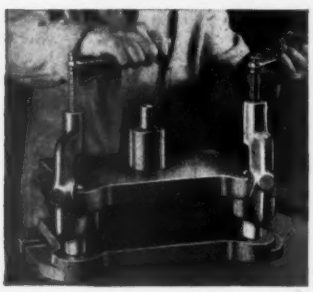


Eliminate trouble and waste effort with this modern method of storing drill rod. Put the Acro rack in a central location of each department and make it simple for each mechanic to select correct rod size in a hurry. It also provides a visual inventory for checking rod replacements.

Accommodates 26 letter sizes, 52 pieces; 47 fractional sizes, 138 pieces; 60 number sizes, 304 pieces. Fractional sizes graduated in 64ths from 1/32" to 1/2" and in 32nds from 1/2" to 1" included.

Also available in half size with fractions or numbers.

DIE SET PULLERS



The principle of the Acro Die Set Puller is to remove the punch holder from the die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving both leader pins simultaneously. This is accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented Acro feature, found only in Acro Die Set Pullers. Available in three sizes.

Free Data

covering each of these profitable accessories is included in our folder. Write for bulletin TP-55

ACRO

METAL STAMPING CO.

330 EAST RESERVOIR AVE.

MILWAUKEE 12, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 16

NOW MILL OR GRIND EXTERNAL or INTERNAL CONTOURS

(CAMS, TEMPLATES, BLANKING PUNCHES AND DIES)

- DIRECTLY FROM SIMPLE LINE DRAWINGS
- WITH EXTREME ACCURACY
- IN MINUTES INSTEAD OF HOURS
- WITH NON-CONTACTING TRACER CONTROL

the ALL NEW Model 104 electronic CAM and TEMPLATE Machine

Using a new and unique non-contacting tracer control, the Model 104 works direct from simple, large-scale line drawings easily prepared with electrically conductive "ink". The contour of the drawing is reproduced at the milling head at **any reduced** scale, such as 5:1, 10:1, 20:1, or higher. Any errors in the drawing are proportionately reduced, resulting in extreme accuracy of the workpiece. Since neither model nor complex tooling-up is required, production costs are minimized. Built for continuous, heavy-duty operation, the Model 104 provides a wide range of spindle speeds (48 to 11,500 rpm) and ample power to assure efficient milling or grinding of practically any desired metal or alloy.

If you are producing external or internal cams, templates, and blanking punches and dies of irregular, complex shape . . . here are important opportunities for added precision, reduced production time, and cost savings never before possible!

USE THIS COUPON TO SEND FOR COMPLETE INFORMATION TODAY

MANUFACTURED BY THE NEW ENGLAND MACHINE & TOOL COMPANY

Sales . . . and Complete Sales Engineering and Maintenance Service . . . Through

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONNECTICUT, U.S.A.

SINCE 1860 *First Choice for Accuracy*

BRANCH OFFICES IN PRINCIPAL CITIES

MACHINE TOOLS • CUTTING TOOLS • GAGES

PRATT & WHITNEY -- DIV. NILES-BEMENT-POND CO.
15 CHARTER OAK BLVD., WEST HARTFORD 1, CONN.

Please send my free copy of Circular No. 582 fully describing the new Model 104 Cam and Template Machine.

NAME_____

POSITION_____

COMPANY_____

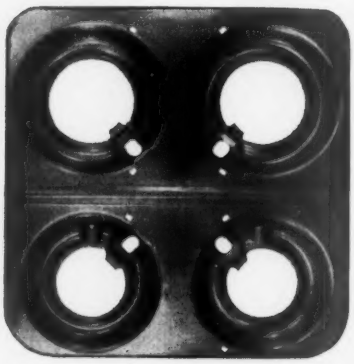
CO. ADDRESS_____

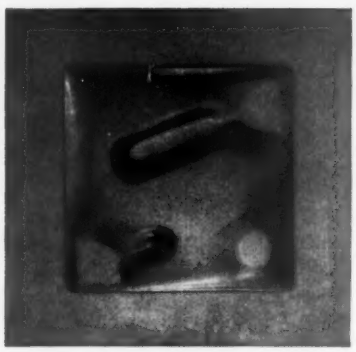
CITY_____ ZONE_____ STATE_____

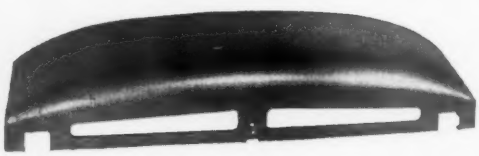
Plastic Low Cost Tooling

For

Dies ··· Drill, Welding, and Assembly Jigs







Vulcan, keeping pace with modern tooling, can recommend plastic tooling for medium production on numerous tool programs.

Plastic tools are light in weight, have good impact, compressive strength and dimensional stability. No hand finishing of parts required as galling or marking is eliminated by using plastic form dies.

Contours and odd shapes are cast or laminated to suit individual tools, saving expensive machine and hand finishing operations.

Plastic tools, built in a matter of days instead of weeks, lower your tool costs for those medium production runs.

Our actual production figures prove plastic has a definite place in modern production.

Vulcan Tool Company's organization, building fine tools since 1916, believes new tooling developments must be proved by tool engineers. Since plastic is not a cure-all your problem should be handled by recognized, practical tool men.

Our engineering staff will recommend the correct plastic material and advise if parts of your tooling program should be in plastic.

Send a part print and your production requirements for quotation and recommendations.

Major Vulcan Services . . . Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

VULCAN TOOL CO....PLASTIC TOOL DIVISIO

27 PRITZ STREET • DAYTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 18

More than meets the eye

P-K Socket Screws, at a glance, may look substantially like those you buy from "habit." You have to "look *beyond* the hex" for the difference.

If you don't, you are buying with a "blind spot" that can block your way to *proved* benefits other buyers are using to advantage. Parker-Kalon's exacting Quality Control is only one of the advantages you don't see until you "look beyond the hex."

Look Beyond the Hex

Compare every detail of product and service. Compare for advanced design . . . for proved assembly strength . . . for buying aids, and supply service. Get all the facts, and try P-K Socket Screws. You'll find they take top rating in any test.

Get samples, information from your P-K Distributor, or write: Parker-Kalon Division, General American Transportation Corporation, 200 Varick Street, New York 14, N. Y.

Two of the many steps in the exacting P-K Quality Control routine are illustrated. Left, the metallograph test to check metal structure, and right, the Magnaflux inspection, employing "black light" to reveal any defects.

FOR TOP QUALITY and tolerance gaged to your most exacting specifications — and guaranteed.

FOR ADVANCED DESIGN that speeds assemblies — makes them simpler, stronger — and saves errors.

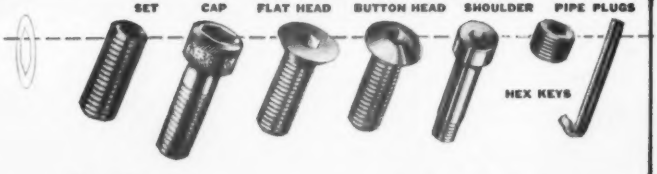
FOR ASSEMBLY STRENGTH okayed in a million punishing tests by thousands of satisfied users.

FOR PLANNING AIDS and buying data patterned to your special needs, plus advice on assembly.

FOR SUPPLY SERVICE set up for fast action and lower purchasing expense — by local Distributors.

FOR ANY STYLE OR SIZE You'll find any Socket Screw you need in P-K's complete line. Hex Keys in all sizes, and several handy sets.

PARKER-KALON SOCKET SCREWS



GET ALL THESE ESSENTIALS OF COST-WISE ASSEMBLY GET P-K

In Stock . . . see your nearby P-K Distributor . . . your local Supply and Service Specialist

CIRCLE INFORM-A-GRAM KEY NO. 19

from interchangeable parts...

Danly Die Set Service is Faster!

Choose the Danly Branch closest to you—

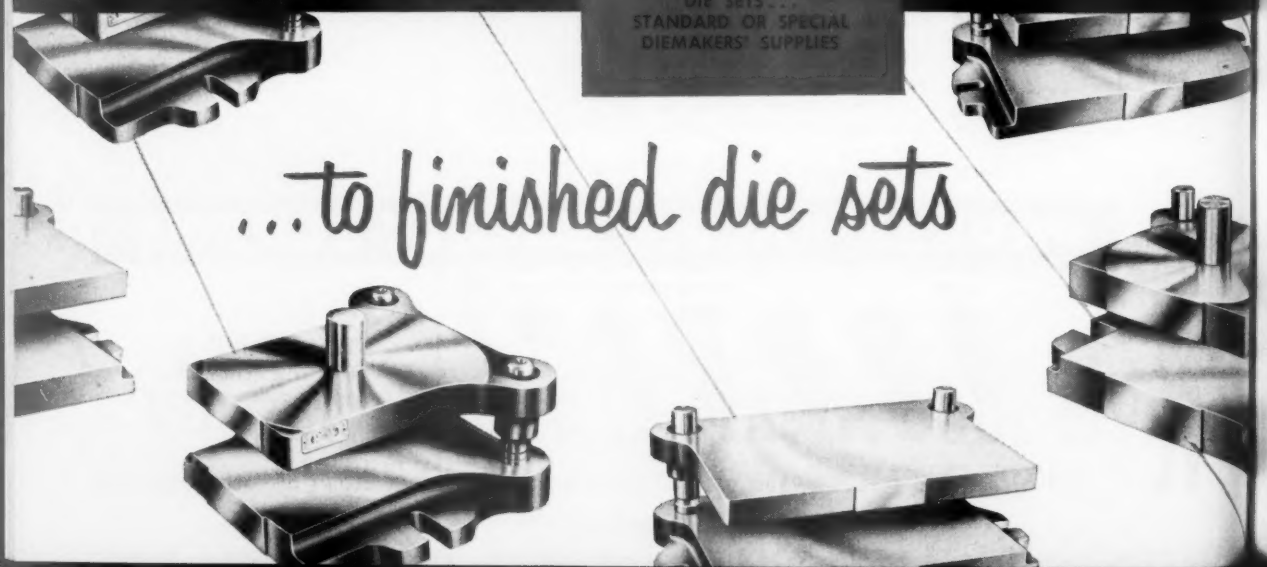
BUFFALO 7	1807 Elmwood Avenue
CHICAGO 50	2100 S. Laramie Avenue
CLEVELAND 14	1550 East 33rd Street
DAYTON 7	3196 Delphos Avenue
DETROIT 16	1549 Temple Avenue
GRAND RAPIDS	113 Michigan Street, N.W.
INDIANAPOLIS 4	5 West 10th Street
LONG ISLAND CITY 1	47-28 37th Street
LOS ANGELES 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
PHILADELPHIA 40	511 W. Courtland Street
ROCHESTER 6	33 Rutter Street
ST. LOUIS 8	3740 Washington Blvd.
SYRACUSE 4	2005 West Genesee Street

One of the main reasons for Danly's faster die set service is the *interchangeability* of die set parts achieved by Danly. It starts at the main Danly Plant where die set components are produced to Danly's traditional high quality, precision standards. The faster service cycle continues at all of the Danly Branch Plants where thousands of *interchangeable* die set components are stocked. The cycle is completed at the Danly Branch in your area where these parts are assembled as a die set to meet your specific requirements and shipped as soon as your order is received. So remember—for the best in die sets in the shortest time, the place to call is your local Danly Branch.

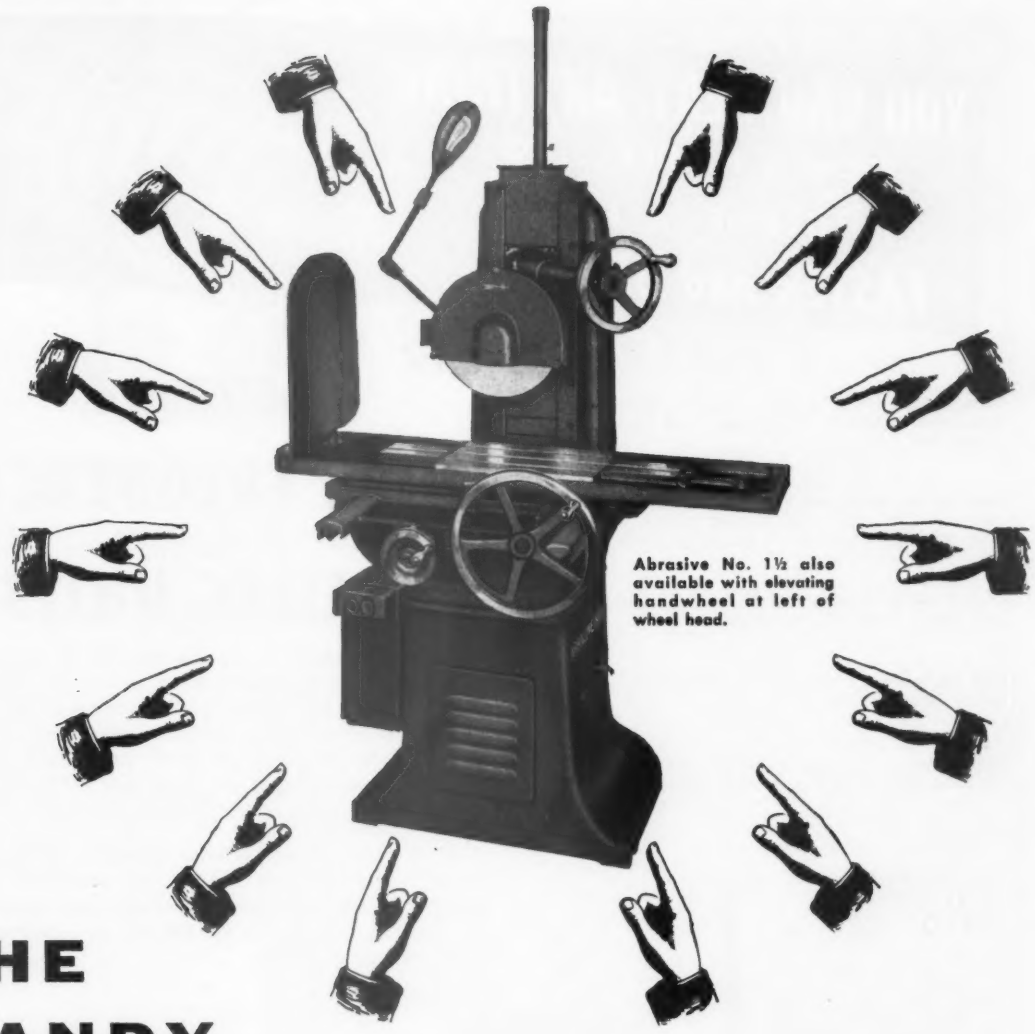
DANLY

DIE SETS... STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue
Chicago 50, Illinois



...to finished die sets



Abrasive No. 1½ also available with elevating handwheel at left of wheel head.

THE HANDY SURFACE GRINDER

ABRASIVE No. 1½ is the hand feed toolroom grinder designed for maximum handiness. Handiness — to quickly produce different jobs regardless of size, with its 15" x 10" work table. And handiness that pays off in toolmaker popularity. Large convenient handwheels, for controlling depth of cut and longitudinal and crossfeed movements, make any precision grinding job a fast one on the Abrasive No. 1½.

The many one-of-a-kind jobs which can tie up your toolroom are easily handled by Abrasive No. 1½. Your proof of this grinder's versatility can be seen in the thousands of shops where this grinder is producing at least 25 jobs a day.

Standard equipment — 1 H.P. motorized spindle. Available with 2 H.P. spindle at slightly increased price.

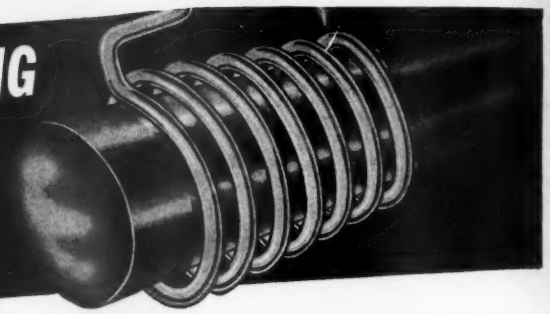
For complete specifications, send for Abrasive No. 1½ Catalog. Abrasive Machine Tool Company, 16 Dunellen Road, East Providence 14, R. I.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

ABRASIVE QUALITY IS REFLECTED IN THE FINISH OF YOUR PRODUCT

CIRCLE INFORM-A-GRAM KEY NO. 21

YOU CAN HEAT ANYTHING
FROM A NEEDLE . . . TO
A TURBINE SHAFT
FASTER and BETTER



WITH Lepel

HIGH FREQUENCY *Induction* HEATING UNITS

BRAZING
Permits widest choice of silver or copper brazing alloys from lowest to highest melting points. Ideal for brazing carbide tips.

HARDENING
Heat localized exactly where wanted at desired temperature. Ideal for gears, cams, bearing surfaces, cutting tools and other areas that are subject to wear.

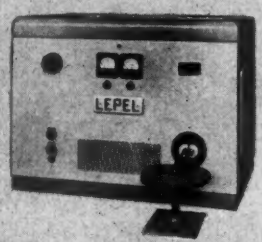
SOLDERING
Speedily and neatly performs intricate soldering applications with or without the use of preformed rings.

ANNEALING
Ideal for annealing, stress-relieving, normalizing or preheating selected areas.

MELTING
Readily melts quantities of ferrous and non-ferrous metals in either graphite or ceramic crucibles.

The Lepel line of induction heating units represents the most advanced thought in the field of electronics as well as the most practical and efficient source of heat yet developed for industrial heating. With a background of half a century of electrical and metallurgical experience, the name Lepel has become the symbol for quality in induction heating equipment embodying the highest standards of engineering achievement, dependable low cost operation and safety.

If you are interested in the application of induction heating you are invited to send samples of the work with specifications of the operations to be performed. Our engineers will process these samples and return the completed job with full data and recommendations without any cost or obligation.



2½ KW INDUCTION HEATING UNIT

30 KW INDUCTION HEATING UNIT

100 KW INDUCTION HEATING UNIT

LEPEL Electronic Tube GENERATORS
1 KW; 2½ KW; 5 KW; 10 KW; 20 KW; 30 KW; 50 KW; 75 KW; 100 KW.

LEPEL Spark Gap Converters
2 KW; 4 KW; 7½ KW; 15 KW; 30 KW.

All Lepel equipment is certified to comply with the requirements of the Federal Communications Commission.

WRITE FOR THE NEW LEPEL CATALOG . . . 36 illustrated pages packed with valuable information on high frequency induction heating.

LEPEL HIGH FREQUENCY LABORATORIES, INC.
55th STREET and 37th AVENUE, WOODSIDE 77, NEW YORK CITY, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 22

Only GRAPH-MO® gives you all three advantages in one tool steel

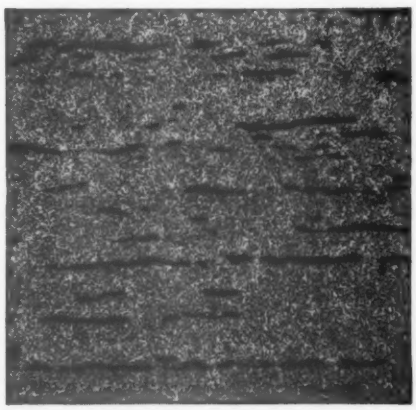
Wearability—*Outwears other tool steels 3 to 1*

Stability—*Is the most stable gage steel ever made*

Machinability—*Cuts machining time 30%*

YOU can make gages and dies that stay accurate longer and produce them in less time by using Graph-Mo® graphitic tool steel. That's because only Graph-Mo gives you the combination of wearability, stability and machinability that you want in a tool steel.

Free graphite and diamond-hard carbides in the structure of Graph-Mo steel give gages and dies extraordinary life. Reports from users show that Graph-Mo outwears other tool steels 3 to 1.



100X

In your plant, Graph-Mo steel will cut production time and rejects. Because of its graphitic structure, Graph-Mo steel machines 30% faster than other tool steels. This structure also gives excellent resistance to abrasion, and has minimum tendency to pick up, scuff or gall. Tests on Amsler Wear Machine show Graph-Mo has twice the resistance to galling when compared with ordinary tool steels.

The greater stability of Graph-Mo steel enables you to make gages that stay accurate longer. After 12 years of service, for example, a typical Graph-Mo steel master plug gage showed less than 10 millionths of an inch change from its original dimensions.

You can always tell Graph-Mo steel by its "graphitic look"—the tiny, scattered, parallel marks barely visible on the surface of a piece of polished Graph-Mo. This built-in "trade-mark", the result of free graphite in its structure, can't be duplicated in ordinary steels. The photomicrograph at left shows the free graphite and diamond-hard carbides that give Graph-Mo unusual wear resistance.

Write today for more information on Graph-Mo steel. The Timken Roller Bearing Company, Steel and Tube Div., Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

CIRCLE INFORM-A-GRAM KEY NO. 23

More

CAPACITY
...VERSATILITY
...RIGIDITY
...ACCURACY *

More for your money in the new

U. S. VERTICAL MILLING MACHINE!

U. S. Vertical's balanced rigidity is the key to profitable production. Make the same comparison made by hundreds of plants. See why they find the U. S. Vertical to be the low-cost mill they demand. New "U. S." features include hard chrome plated quill, precision honed head and overarm bosses; and a quick change collet draw bar. Write today for complete details. The U. S. Burke Machine Tool Division, 7 Brotherton Road, Cincinnati 27, Ohio.

*Accuracy Certified! Check list showing results of actual inspection tests accompanies each machine.

Compare

FEATURES

- Balanced head and motor
- Simplified belt-speed changing
- Conveniently located reversing switch
- Protected knee gearing
- Lubricated-sealed ball bearings
- Built-in spot light
- Swing-out Tool-Keeper
- Guaranteed close tolerances*
- Hardened and ground lead screws (optional)

Compare

SPECIFICATIONS

	U. S. VERTICAL
Table Size	9½" x 36"
Longitudinal Feed	24"
Cross Feed	9¾"
Knee Travel	16½"
Quill Travel	5½"
Dovetail Depth	1¼" x 1½"
Vertical Screw	1⅜" dia.
Weight	1600 lbs.
Table Power Feed	0" - 12" per min. (infinitely variable)

CHECK THESE AGAINST ALL COMPETITION!

Compare

DELIVERY, too!

. . . our new plant addition permits us to promise and fulfill prompt deliveries.

THE U·S·Burke MACHINE TOOL DIVISION

CIRCLE INFORM-A-GRAM KEY NO. 24

Miller HIGH PRESSURE HYDRAULIC CYLINDERS

HARD CHROME PLATED PISTON RODS
Prevent Scratch-Damage, Nicks and Rust

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage

DIRT WIPER SEALS
Protect Rods, Seals, Bushings

Standard Leather Cup Seal Assembly Shown Is Interchangeable With Miller Standard Piston Ring Piston Assembly

Thousands of Different Selections For Immediate Delivery!

Rapidly expanding list of quality-famous Miller Cylinders for immediate, off-the-shelf delivery now includes thousands of different, popular selections — both hydraulic and air — cushioned and non-cushioned. Bores up through 5" hydraulic, 8" air. Over 30 different mountings. Strokes up to 18".

Larger bores (up to 12" hydraulic, 20" air) and longer strokes (up to 22 feet) available on longer delivery. Miller Boosters also in stock for immediate delivery.

Write for Complete Catalog and Stock List!

WRITE FOR CYLINDER BULLETINS H-104 and A-105

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

MET J. I. C. HYDRAULIC STANDARDS years before their adoption in 1949.

SPACE-SAVING SQUARE DESIGN originated by Miller in 1945.

SALES AND SERVICE FROM COAST TO COAST

CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

Miller

MILLER FLUID POWER CO.
(Formerly MILLER MOTOR COMPANY)

2046 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS

YOU GET *SPEED* PLUS ACCURACY

WITH MOORE JIG GRINDERS

HOLES from 1/64" to 8" Relocated and Ground within .0001" in One-Third Previous Time

Before hardening, this two-station die block was Moore-Jig-Bored to eliminate the need for excessive grinding. After hardening and surface grinding, all holes were Moore-Jig-Ground to exact size and location. Blank hole and center piercing hole were ground with ½° included taper. Little clearance could be allowed between punch and die. Jig grinding time: *only 2¾ hours.*

CONTOURS, Too, Accurately Jig Ground and Checked in One Setting

This flanged punch, impractical to grind by any other method, was a natural for the No. 2 Moore Jig Grinder. All radii—male and female—were ground accurately to location and size. The piece, having been set up on a rotary table, was aligned to permit grinding of the angular surfaces. And the entire contour was inspected by the "indicator measuring" method while the punch was still on the machine.

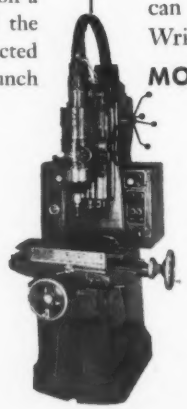
The word "versatile" must have been coined for the No. 2 Moore Jig Grinder. Not only does this machine relocate and grind straight and tapered holes with ease, but it contour grinds, chop grinds and slot grinds just as skillfully.

The Moore Jig Grinder, together with its toolroom teammate, the Moore Jig Borer, enables tool and die sections to be produced concurrently, puts diemaking on an interchangeable-parts-and-assembly basis. And it's also a time-saver on production jobs.

Employing the accurate lead screw measuring principle and a convenient system of coordinate hole location, the fast and sure Moore Jig Grinder eliminates hours of checking on bench and surface plate.

Why not find out how this remarkable machine can save *you* sizeable chunks of time and money. Write today for our detailed bulletin.

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Ave., Bridgeport 7, Conn.



NO. 2 MOORE JIG GRINDER
Range 10" x 16" x 16" height. Grinding speeds from 12,000 to 60,000 rpm. Infinite feeds up and down; spindle-housing heat control. Features slot grinding attachment.

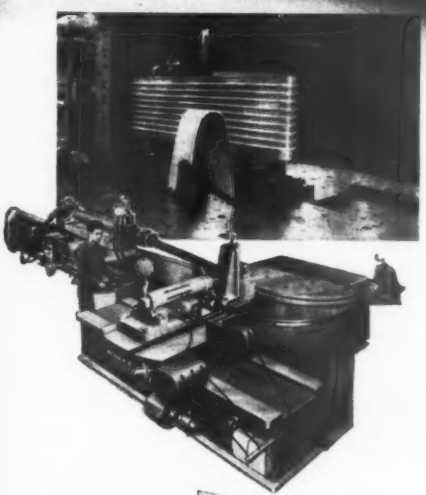
ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

see our catalog in MACHINE TOOL CATALOGS or write for copy

CIRCLE INFORM-A-GRAM KEY NO. 26

HEAT DEFLECTION... ...at 2000 M.P.H.



The newest approach to the problem of the phenomenal heat generated at high speeds, known today as the THERMAL BARRIER, is to deflect the heat from the pilot and vital parts of the plane.

Photograph to the left shows the deflecting, or corrugated sheets being formed on a BATH Stretch Forming machine. These particular corrugated sheets are for leading wing-edge construction.

Catalogs describing BATH Stretch Forming, Compression Forming, Radial Draw Forming, or Contract Forming are available for the asking...

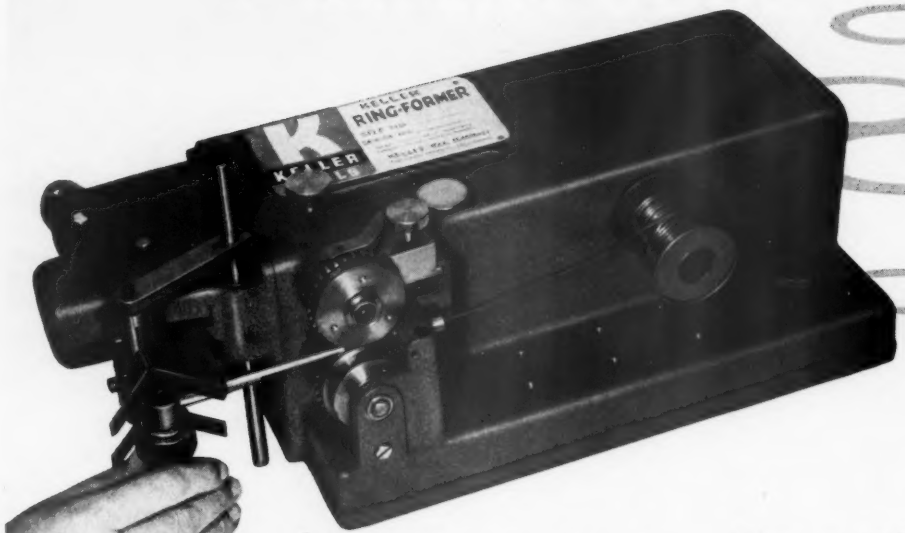
THE CYRIL BATH COMPANY

32380 AURORA ROAD • SOLON, OHIO
(LOCATED IN THE GREATER CLEVELAND AREA)

MANUFACTURERS OF RADIAL DRAW FORMERS • DIES • TOOLS • PRESS BRAKES • TANGENT BENDING SEQUENCE PRESSES • PRESS TYPE BRAKES • SPECIAL MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 27

KELLER'S new Ring-Former speeds production brazing of cylindrical parts



Automation has a new helper to speed production and reduce costs of soldering and brazing tubular and cylindrical parts.

It is the new air-operated Keller Ring-Former which forms a ring of soft solder wire or brazing alloy *right in position* on the part. The ring is formed and cut automatically to size, fitting snugly to make a strong, smooth bond when subjected to torch, furnace or induction heating. Rings can also be formed "in the open" if desired.

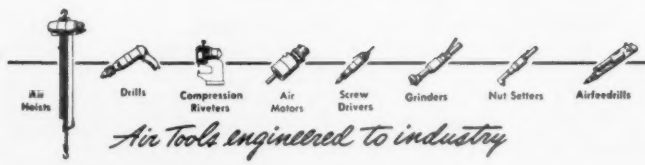
Rings are made to any diameter from ¼ inch to 3 inches.

The new Keller Ring-Former puts an end to dropped and wasted rings. Since rings are made only as needed, it saves the storage problem of stocking preformed rings. It simplifies and speeds the entire brazing operation.

Full information is contained in Bulletin 51, which we will send gladly on request. Ask your nearest Keller sales office to arrange a demonstration.

Another
KELLER AIR TOOL
Engineered to Industry

KELLER Ring-Former



Air Tools engineered to industry

KELLER TOOL COMPANY
1313 FULTON STREET
GRAND HAVEN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 28

ALLENPOINT SET SCREWS Proved 5 Ways Better

Tested by a prominent independent laboratory against standard cup point and serrated point set screws, Allenpoint socket screws topped them all. In every test — carefully set up to simulate actual installations — Allenpoints outperformed and outlasted competing set screws.

BETTER *Cup Point Pattern*

Allenpoints make the all-important full circle pattern when tightened up to *ordinary* pressure — the normal force exerted to tighten a socket screw by hand.

BETTER *Resistance to Rotation*

Deep driven Allenpoints hold longer under increasing torsional strain than any other set screw tested.

BETTER *Cup Point Depth*

The deeper they drive the tighter they hold. Allenpoints — again at average wrenching pressure — penetrate smoothly and deeply with no gouging, no cutting action.

BETTER *Resistance to Longitudinal Thrust*

Tighten an Allenpoint held collar to a shaft with a wrenching pressure of only 150 inch pounds. It will take 1200 lbs. of longitudinal thrust to start that collar along the shaft. No pipe extension, no twisted wrenches to get effective tightening pressure. Allenpoints hold tightly at average *hand wrenching* pressure.

BETTER *at Withstanding Vibration*

Long after other set screws loosen their grip, Allenpoints hold firm under repeated vibration.

Write our Advertising Department for a detailed, technical brochure on these comparative tests. It's got the facts on the Allenpoint story.

ALLEN HEAD

ALLEN

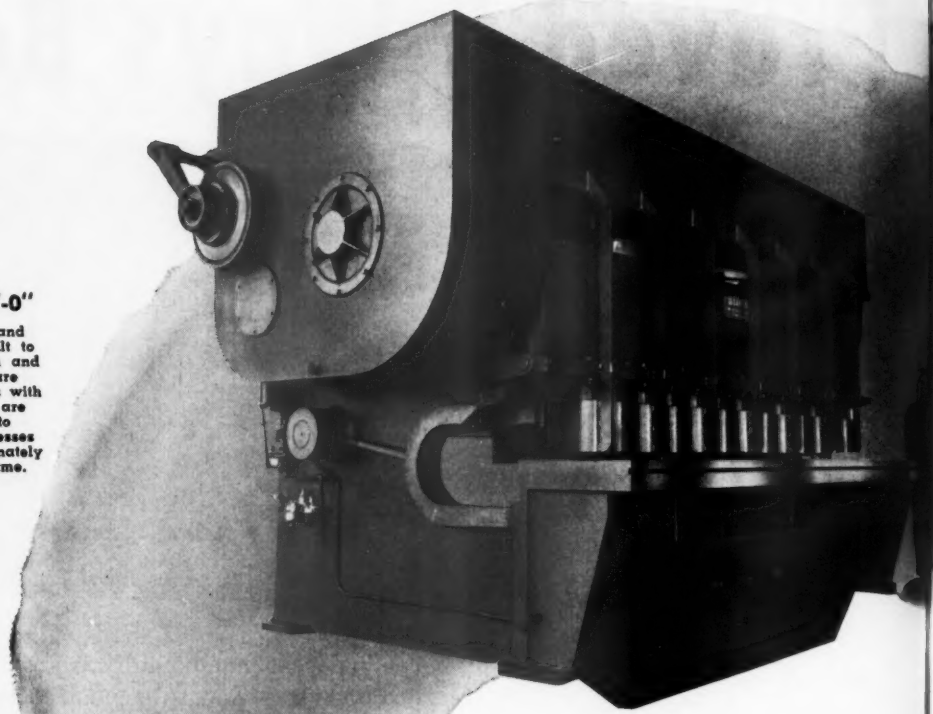
MANUFACTURING COMPANY
Hartford 2, Connecticut, U. S. A.

Sold Only Through Leading Industrial Distributors.

Specify Genuine Allenpoint Set Screws.

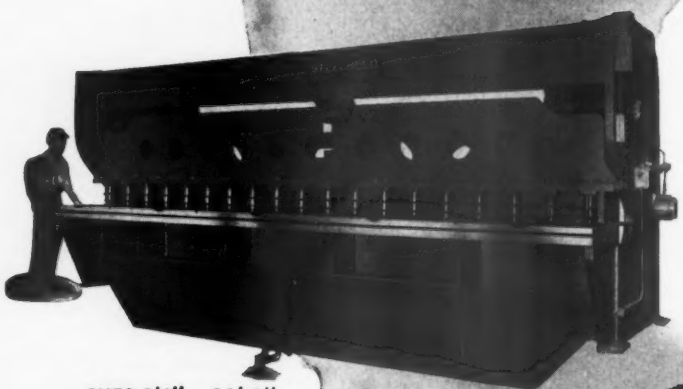
CIRCLE INFORM-A-GRAM KEY NO. 29

STEELWELD SHEARS and PRESSES



CUTS 1 1/4" x 12'-0"

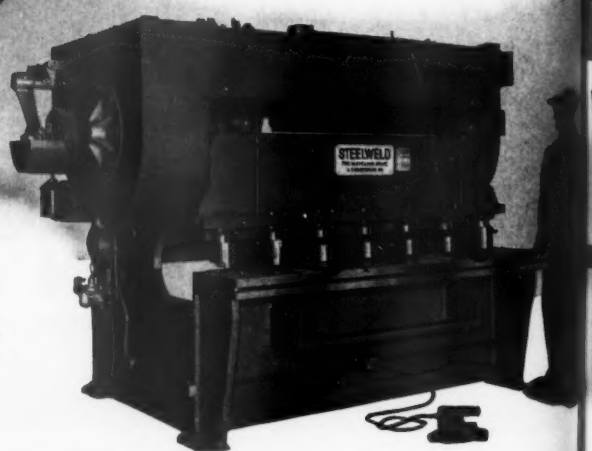
All Steelweld Shears and Presses are heavily built to provide great strength and rigidity. Their frames are all-welded one-piece units with the bed integral. There are no bolted connections to loosen or misalign. Stresses are distributed proportionately to all parts of the frame.



If you work with metal plate of any thickness to 1¼ inch or length to 20 feet, you will find many points of advantage in heavy duty Steelweld Shears and Presses. Their designs are different from conventional machines. As a result, they have many exclusive features not available elsewhere.

CUTS 1/4" x 18'-0"

Controls are conveniently located at front and right end. The closely-spaced, spring-operated hold-downs hold various thickness plates solidly during shearing. They are practically fool-proof and grip the plate close to line of cut.

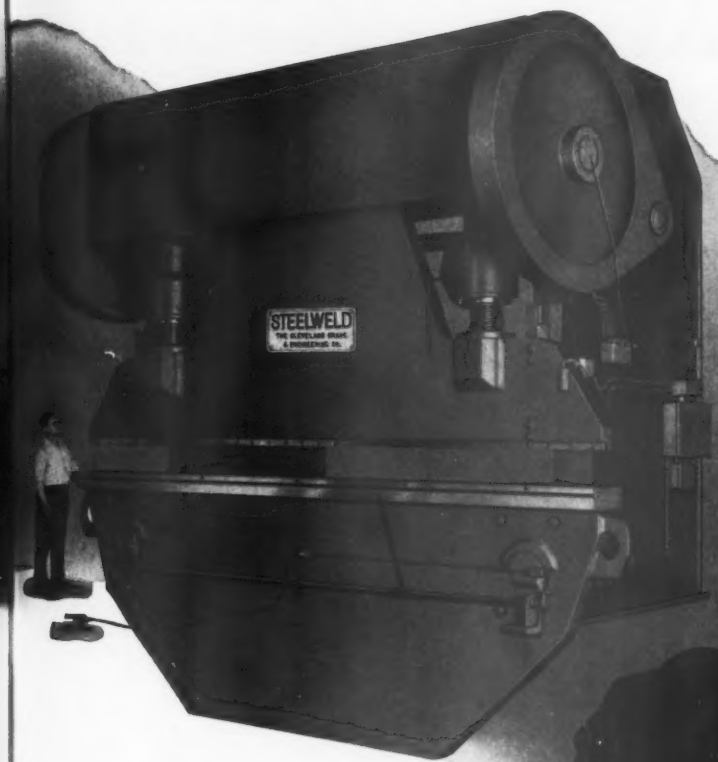


CUTS 3/16" x 6'-0"

Only Steelweld Shears have a pivoted-blade. This overcomes handicaps of guillotine type shears. There are no guides or slides to wear and cause inaccuracies. Whether small or large size, Steelweld Shears are heavily built for hard, continuous service.

CIRCLE INFORM-A-GRAM KEY NO. 30

For HEAVY DUTY SERVICE...



BENDS 1/2" x 20'-0"

Bending, forming, blanking, drawing and multiple-punching are done quickly on Steelweld Presses. By making beds of long machines extra deep, deflection is eliminated for all practical purposes and straight, accurate bends to close tolerances assured.

BENDS 1/4" x 10'-0"

This popular model is widely used for work on steel, aluminum and many alloys. Throats of all Steelweld Presses are 18" deep, permitting unusual bending possibilities. Throats to 36" deep are available for some models.

Whether or not you are in the market for a shear or press, we urge you to send for the illustrated booklets below. Get the facts on these modern machines that are now serving hundreds of varied production jobs so successfully.

SEND FOR FREE BOOKLETS

SHEARS

Booklet 2011 covers pivoted-blade construction and other details.

PRESSES

Booklet 2010 describes many outstanding features of Steelweld Presses.

THE CLEVELAND CRANE & ENGINEERING CO.

8740 E. 281 ST., WICKLIFFE, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 30

Microbore

STANDARD BORING BAR SETS for TURRET LATHES

Incorporating Micrometer Vernier Adjustable Tools

A comprehensive range of Standard Microbore Boring Bar Sets is available for use on all makes and sizes of turret lathes.

Send for Illustrated Catalog

DEVLIEG MICROBORE COMPANY
2720 West Fourteen Mile Rd. • Royal Oak, Michigan

Discuss your tooling problems with our Microbore specialists.

CIRCLE INFORM-A-GRAM KEY NO. 32

Dependable on-the-job FIXTURE PERFORMANCE!

Swartz

PRECISION

WORK-HOLDING FIXTURES

FOR AUTOMATIC TRANSFER and INDEX MACHINES

It's the dependable on-the-job performance of Swartz fixtures which sums up the many advantages Swartz service provides both buyer and builder of automatic machine tools. That's why Swartz fixtures were specified for this special 14-station Transfer Machine.

More than 30 years of seasoned experience and know-how, together with modern fixture-building facilities, are back of the Swartz specialized fixture-building service. It is an out-of-the-ordinary service, complete in every detail, with a number of distinct advantages . . . advantages it will pay you to investigate.

A Swartz engineer will gladly give you the facts, and point out the many ways this efficient, profitable service can be put to work for you.

WRITE TODAY FOR YOUR COPY OF THE NEW SWARTZ BROCHURE! THE INTERESTING DETAILS OF SWARTZ SERVICE ARE OUTLINED IN THIS NEW BROCHURE, "ADVANCING AUTOMATION," AND A COPY WILL BE MAILED ON REQUEST.

Designers and Builders of Precision Work-Holding Fixtures for More Than 30 Years

SWARTZ TOOL PRODUCTS

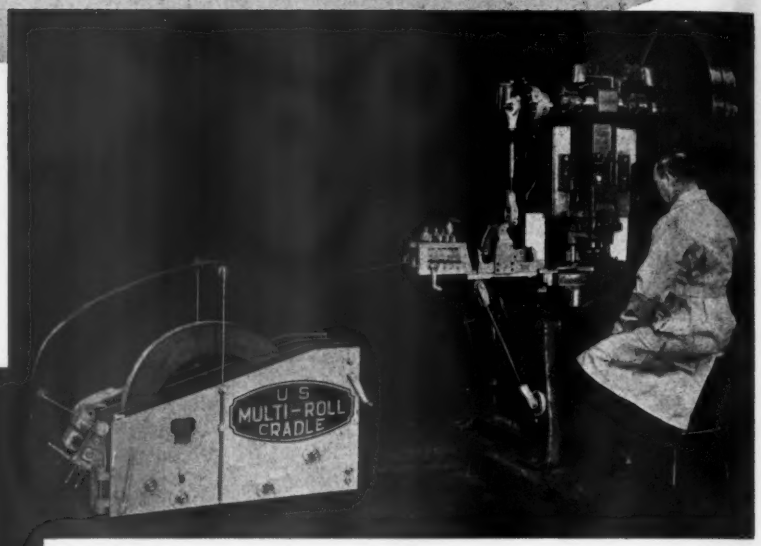
Division of Jefferson Corporation

13336 FOLEY AVENUE • DETROIT 27, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 33

For maximum press room efficiency . . . For controlled unwinding of all types of stock in coils . . .

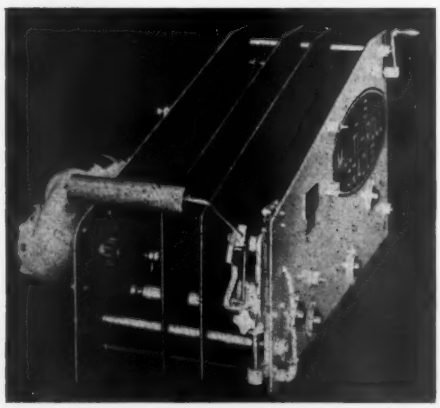
THE U. S. MULTI-ROLL CRADLE



U. S. Multi-Roll Cradle Model ACC-1-9C, with four power-driven rest rolls plus a pair of power-driven take-out rolls. A geared motor of 1/3 H.P., 155 R.P.M. gives output speeds up to 80 feet per minute. For special applications other motors can be provided. The cradle will handle stock up to ⅛ inch in thickness, 9 inches in width, and coils with OD up to 40 inches. Photo shows Multi-Roll Cradle set up with a U. S. Stock Straightener and a U. S. Slide Feed to make the press completely automatic.

Above: In the smaller sizes, coils of stock can be easily rolled into the cradle by one man. During the loading the take-out roll assembly is released by a trigger latch and swung to the side. It snaps securely into place when swung back into operating position.

Below: Model ACC-1-9NT with four power-driven rest rolls only. This unit is designed so that power-driven take-out rolls can be added at any time.



With the U. S. Multi-Roll Cradle you can get the fullest benefits from the inherent advantages of using stock in coils. It has been designed to enhance press performance by unwinding stock in a steady, smooth run under complete control at all times. This is accomplished with four power-driven coil rest rollers mounted in self-aligning bearings and arranged in an arc to equalize weight distribution. In addition, on Model ACC-1-9C further power is provided by a pair of power-driven take-out rolls to completely unwind coils which have a tendency to sag or slip when rest rolls only are used. Both sets of rolls are actuated by a loop control arm which operates through a micro switch. The stock can pass over the roll or press against it; either way, the feed to the press is positive and constant and can be adjusted to rates up to 80 feet per minute. When handling some types of coils the power-driven take-out rolls may not be required and the cradle can be purchased with the four power-driven coil rest rolls only (Model ACC-1-9NT). On this unit the power-driven take-out rolls can be easily added later if needed.

The U. S. Multi-Roll Cradle is also designed for easy and rapid coil loading, and the compactness of the frame and the controlled unwinding feature make it possible to set it up close to the press for most economical and safe use of floor space.

Get full details and specifications of the U. S. Multi-Roll cradle in special bulletin 90-P. Write for your copy today.

U.S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

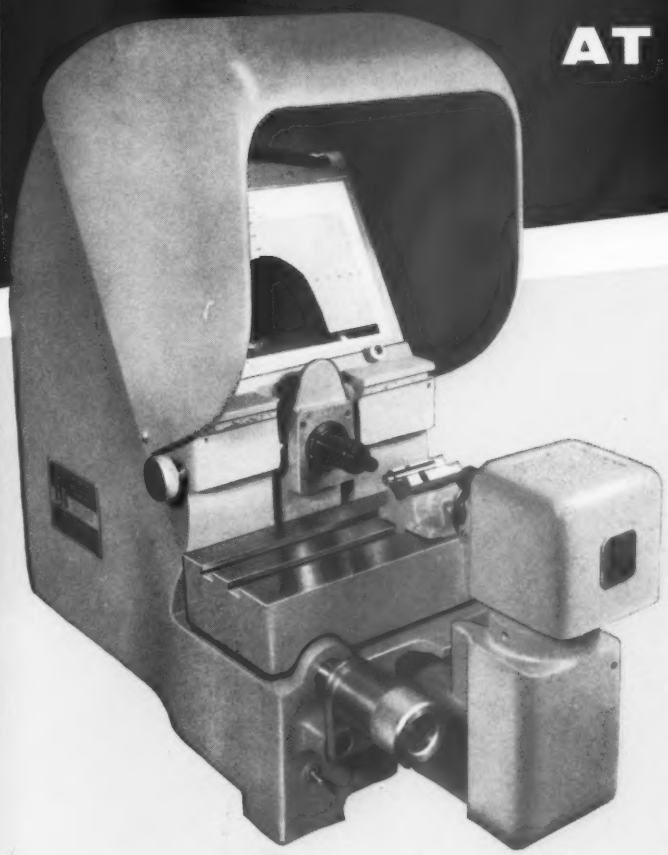
Builders of U. S. Multi-Slides—U. S. Multi-Millers

U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories

CIRCLE INFORM-A-GRAM KEY NO. 34

accurate production inspection . . .

AT LOW COST

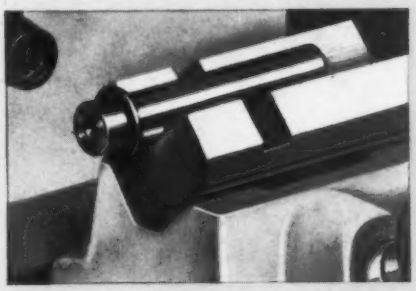


The inspection of "O" rings is a good example of the difficult jobs that are easily handled by the J & L BC-7 optical comparator. The rubber rings are held on a simple plug gage which duplicates their positioning in final assembly. The operator then merely looks at the chart on the viewing screen to check for thickness and amount of flash. The chart is a standard grid, laid out in .050″ squares which represent .001″ on the "O" ring at 50 magnifications.

There is *no* danger of distorting the piece as there would be in mechanical gaging. Only this one gage is used, because the optical comparator inspects in *all* planes.

The Jones & Lamson
BC-7 Optical Comparator

a versatile...economical...
easy-to-operate bench gage



By merely changing the fixture and chart, a great variety of totally different parts can be inspected accurately and economically.

JONES & LAMSON

World's Largest Manufacturer of Optical Comparators since 1919

JONES & LAMSON MACHINE CO., 519 Clinton St., Dept. 101, Springfield, Vt., U.S.A. J&L OPTICAL COMPARATOR DIV.

CIRCLE INFORM-A-GRAM KEY NO. 35

IT'S HERE!

NIAGARA
MACHINE & TOOL WORKS
1879 75 1954

...a great, new line of inclinable presses

FEATURING
the exclusive Niagara Electro-Pneumatic Clutch

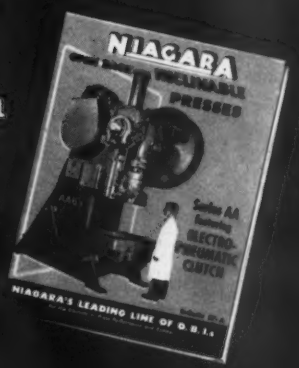
- Combines prime advantages of friction and mechanical sleeve clutches.
- Has no friction surfaces to slip, heat or wear.
- Provides a positive drive that engages or disengages instantly, at any point in stroke.
- Can be single-stroked, jogged or run continuously.
- Operates effortlessly by palm buttons or foot switch.
- Stops automatically if power or air pressure fails — an important safety feature.

Never before in O. B. I. Press history, has there been so significant a development as this new Niagara line . . . Series AA. Built in eight sizes, with shaft diameters from 3 to 7½ inches, it has set a new high for performance and stamina in blanking, forming, drawing, perforating, combination die and automatic feeding operations.

Get the complete story. Send for literature. Talk with our representative. SEE the press in action. Compare! Then, decide.

AND YOU'LL FIND ALL THE FACTS IN HERE!

BULLETIN 57-A
Sent free...promptly!

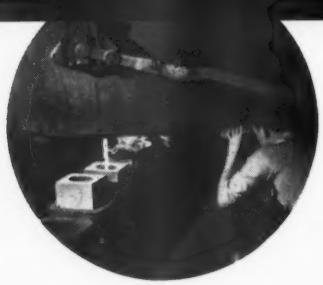


NIAGARA

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

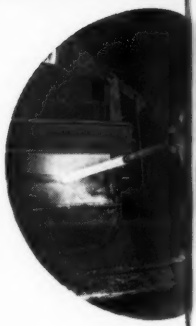
DISTRICT OFFICES
BUFFALO • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA
Dealers in principal U. S. cities and major foreign countries



How Men and Controls Protect Industry's Confidence in *Carpenter* High Speed Steels

The *performance* you get from high speed steels is directly related to *how* they are produced. As a specialty mill where quality overshadows tonnage . . . and all operations are set to this standard . . . Carpenter devotes the time and attention required to produce high speed steels of the finest quality.

From careful scrap purchasing to guaranteed analysis, and painstaking time and temperature checks during melting . . . through rigid controls of bar reduction in rolling, and many other quality tests at all steps . . . these are the "indispensables" that have enabled Carpenter to produce the finest High Speed Steels for 60 years. And most important is the *personal attention* Carpenter men give to every order. The experience, pride and skill these craftsmen put into the production of every bar make Carpenter High Speed Steels your most dependable investment. Your best proof is to place your next order with Carpenter . . . and see what a difference there *can* be in High Speed Steels. THE CARPENTER STEEL COMPANY, 106 W. Bern St., Reading, Penna.



Every Order of *Carpenter* High Speed Steels Undergoes These and Many Other Quality Controls

- All scrap must be of purest quality, guaranteed analyses.
- Small, electric furnace melting units are used to control quality and uniformity to the highest degree.
- Every heat of steel is constantly checked for chemistry, temperature and melting time.
- Preheat and high heat furnaces are guarded for accurate time and temperature to prepare the steel for rolling.
- Percentage of reduction in cogging billets for rolling or forging of bars is skillfully controlled to assure freedom from internal stresses.
- Discs cut from each bar are acid etched, examined, hardened and fractured to certify internal cleanness, soundness, freedom from excessive segregation. And the hot acid etch is backed by Ultrasonic Testing.
- Slugs are cut from each lot of billets and machined in "step-down" fashion to guard against internal seams, shadow lines, etc.
- Extensive laboratory tests are made for proper hardness, micro-structure, grain size.
- Turning tests are run regularly to check cutting efficiency.
- *For best results, put your confidence in . . .*

Carpenter STEEL high speed steels

Speed Handling
Prevent Mishaps
Cut Cost with

SUPERIOR DIE SETS

LARGE SETS NO LONGER NEED BE BLOCKED . . . SMALL SETS CAN BE LIFTED WITHOUT SLIDING.

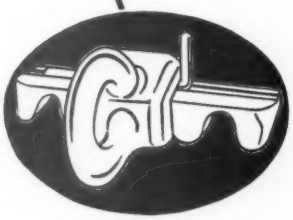
Three features exclusive with SUPERIOR DIE SETS permit rapid assembly, disassembly and overall handling of large and small die sets. In addition they provide safety insurance . . . . protection for the skilled hands of die makers and handlers . . . . protection also against the ruining of costly dies in handling, or even damaging of valuable press equipment.

E-Z LIFT SLING CHAIN

is especially designed to fit the flanges of the die sets. Male jaws attached to the sling fit quickly into place for immediate lifting. There is no need for screw clamps, eye bolts, or lifting lugs.

SAFETY FLANGE

protects fingers by providing roomy gripping space on either side of the die shoe. This flange may be mounted flush or on the edge of the die set and is welded in place. There is no extra charge for this valuable safety feature.



LOCK JAW LIFTING DEVICE

removes the danger of handling large die sets. Heavy steel components of this device are welded in place forming an integral part of the die set. They are positioned to insure proper balance when the set is lifted by either chain fall or crane.

FREE Descriptive Catalog on Time and Money Saving Superior Die Sets and Supplies.

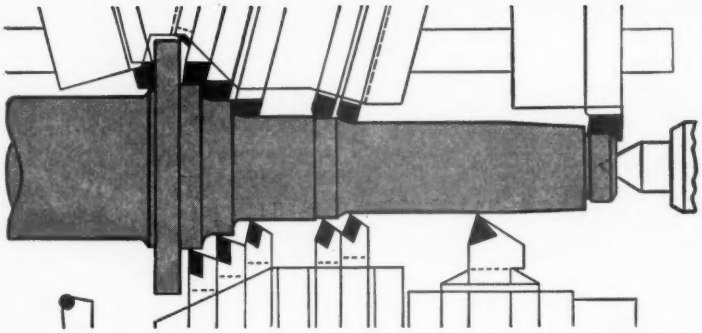
For Fast Local Service Call these Expert Superior Representatives

- Kalamazoo, Mich. Phone 5-7988
- Indianapolis, Ind. BRoadway 5668
- Chicago, Ill. RAndolph 6-8871
- Dallas, Tex. Riverside, 5138
- Rockford, Ill. Phone 3-3932
- St. Louis, Mo. JEfferson 5-1223
- Milwaukee Mitchell 5-6027
- Dayton, Ohio Hemlock 6209
- Memphis, Tenn. Phone 33-7727
- Cleveland, Ohio KEnmore 1-2015
- Eau Claire, Wis. Phone 2-3453
- St. Paul, Minn. PRior 6485
- Winter Park, Fla. Phone 4-0464
- Boston HUbbard 2-3373

SUPERIOR STEEL PRODUCTS CORP.
2754 S. 19th ST., MILWAUKEE, WIS

CIRCLE INFORM-A-GRAM KEY NO. 39

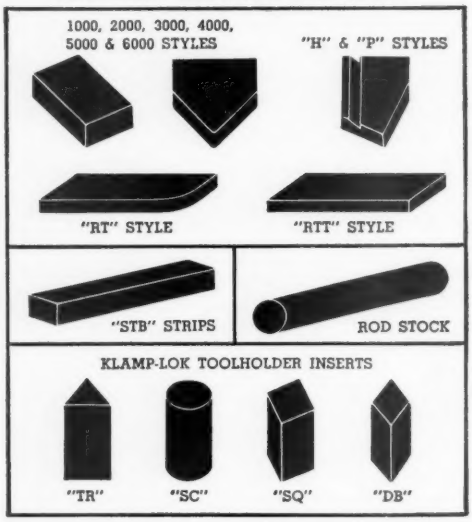
THE TURNING POINT TO HIGHER PROFITS!



PRODUCTION RATE—UP 25%, TOOL COST—DOWN 40%
AT LARGE MID-WEST TRACTOR PLANT

PART.....Shaft Steering Clutch, SAE 8654-H Brinell 370.
OPERATION.....Rough Straddle Face Flange, turn all diameters, form undercut and base.
MACHINE.....16 x 60 Sunstrand Automatic Lathe.
TOOLS.....8 Talide-tipped facing, chamfering, radius and form tools Grade S-88. 7 Klamp-Lok Toolholders with round, triangular and parallelogram Talide inserts Grade S-88.
DEPTH OF CUT..9/32" to 7/16"
FEED.....022
S.F.M.....156
RESULTS.....Production up 25%—Scrap and rejects down.

A FULL LINE OF TALIDE TIPS IS AVAILABLE IN OVER 1000 SIZES, STYLES, SHAPES AND GRADES—TO MEET EVERY MACHINING REQUIREMENT

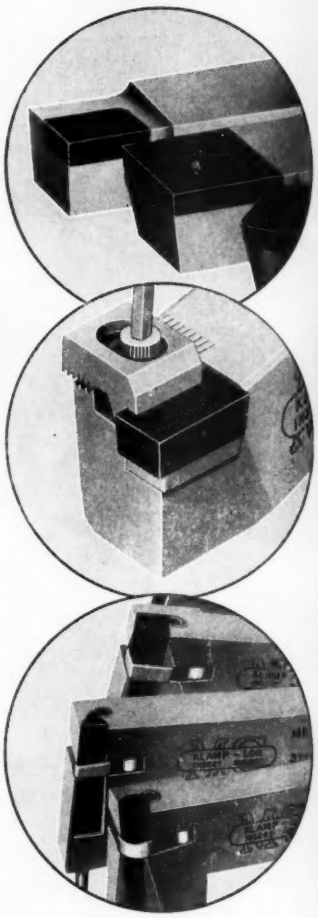


NEW IMPROVED CUTTING GRADES

An extensive 2-year research and development program has resulted in a completely new and improved series of Talide Metal grades for all-purpose machining. "Double-carbides" containing tantalum carbide and tungsten carbide have been perfected for cutting cast iron and non-ferrous alloys, and "triple-carbides" containing tantalum carbide, titanium carbide and tungsten carbide for machining steels.

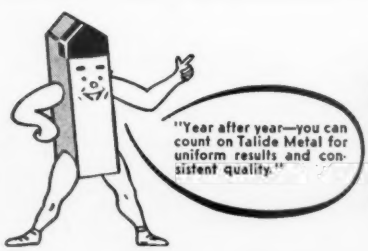
Major improvements have been made in our rigidly controlled vacuum furnace technique. This, along with additional refinements in our process has resulted in the creation of a carbide having a new, unique grain structure possessing harder and tougher properties than previous grades.

ALL-PURPOSE TALIDE TOOLS



Laboratory tests reveal that these new, improved grades have 25% greater strength and rigidity. Extensive field tests have proven that service life per grind is increased up to 50% over previous grades. **Metal Carbides Corporation, Youngstown 7, Ohio.**

Send for new 84-page Catalog No. 55-G.



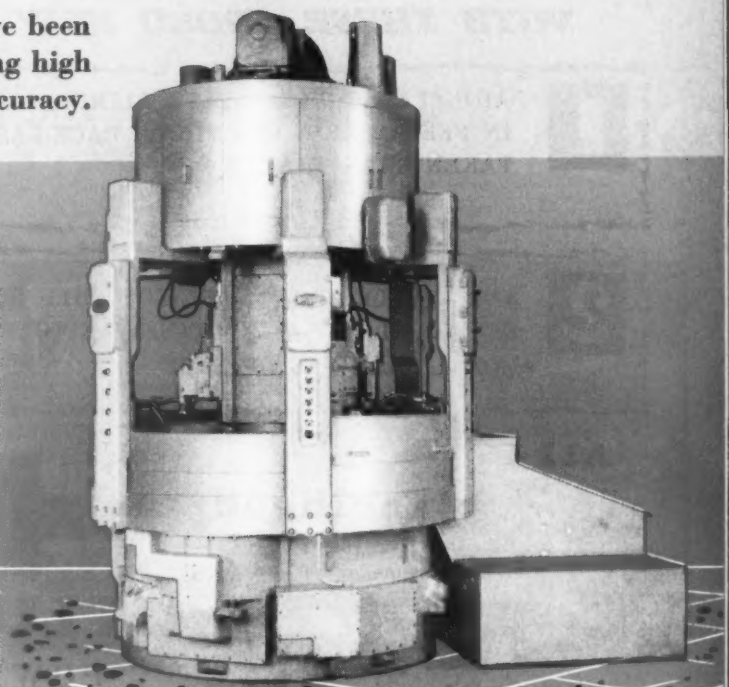
METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 7, OHIO
HOT PRESSED AND SINTERED CARBIDES · VACUUM METALS
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 40

...a new concept of the...

BULLARD MULT-AU-MATIC

Since 1914 Bullard Mult-Au-Matics have been widely used in many industries requiring high production of parts with repetitive accuracy.



Mult-Au-Matic Type "L"
Available in three sizes
10" with 6, 8, 12 or 16 spindles,
14" and 18" with 6 or 8 spindles.

The MULT-AU-MATIC Type "L" incorporates many new developments. Here are some of them:

★ CONTROL SYSTEM

All functions of the machine are controlled from conveniently located push buttons with minimum operator effort and maximum safety.

★ FEED MECHANISM

Completely new screw type feed works provide a 16" stroke with 81 feed changes ranging from .0025 to .0625

★ SELECTIVE SPINDLE SPEEDS

At each station, speed range from 35 rpm to 1,000 rpm allows selection of correct cutting speed to suit operation at each station.

★ CARRIER INDEX

New mechanism permits faster indexing of carrier which saves time between cuts.

★ OPTIONAL EQUIPMENT

Includes multi-purpose heads, drill heads, tapping heads, precision boring heads, automatic loading and gauging equipment and chip removal conveyors.

SEVENTY FIFTH
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ANNIVERSARY

THE BULLARD COMPANY

286 Canfield Avenue • Bridgeport 2, Connecticut

Please send me a copy of the NEW MULT-AU-MATIC TYPE "L" CATALOG

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COMPANY..... POSITION.....

ADDRESS.....

CITY..... ZONE..... STATE.....

For the complete story use this coupon for your copy of the new catalog.

NOW

a better product made BETTER

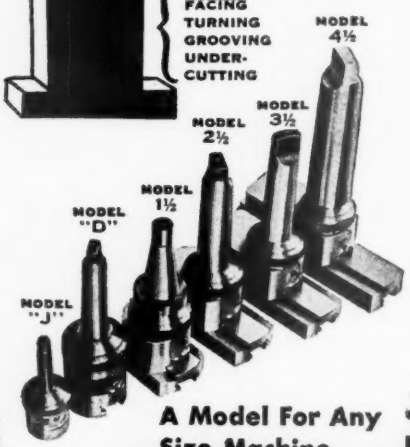
WITH THESE ADDED NEW FEATURES:

1 ADJUSTABLE TAKE-UP TO ELIMINATE END-PLAY IN FEED SCREW ASSEMBLY. BACK-LASH CAN BE TAKEN UP INSTANTLY

2 AND — TALK ABOUT LARGE OFFSET! OUR SMALLEST MODEL HAS ¾ IN. OFFSET AND OUR LARGEST MODEL HAS 4½ IN. OFFSET.

ALL in 1 Toolhead

BORING
FACING
TURNING
GROOVING
UNDER-CUTTING



A Model For Any Size Machine

PLUS-

POWER FEED for FACING and GROOVING

Think THAT Over!

WRITE for our New Catalog with complete information and prices!

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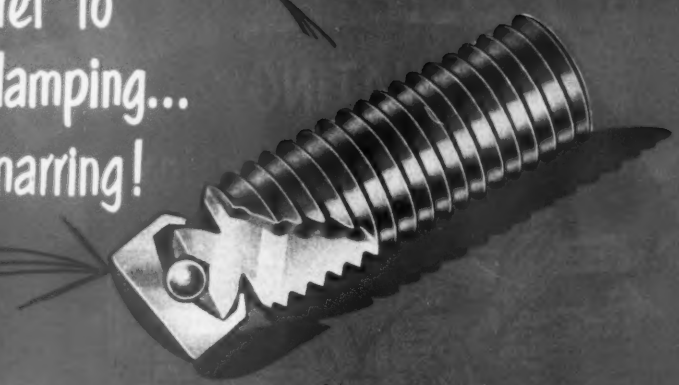
Muncie, Indiana, U. S. A.

A Boring Head That Won't Face is NOT Complete

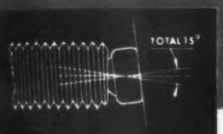
Chandler-Duplex

COMBINED BORING AND FACING TOOLHEADS

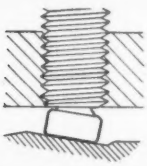
Here's the secret to positive clamping... freedom from marring!



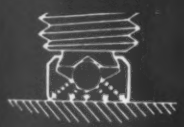
the New Vlier SCREW-BALL CLAMPS!



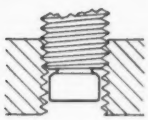
Ball-bearing construction insures frictionless, *automatic* angle adjustment and rotation; pad swivels freely in *all* directions up to 7½° from the centerline!



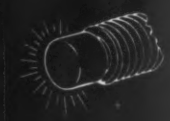
Pad seats firmly on work surface within angular range!



Force distributed equally to pad face. Conical seat distributes force equally in all directions; insures easy alignment in angular applications; greater freedom of motion.



Pad inserts from top of threaded hole or from bottom for easy installation!



Large pad area. Pad is machined from the solid, not counterbored or relieved; has greater strength plus freedom from distortion!

NO MORE EXPENSIVE, CUSTOM-MADE SWIVEL PADS . . . 17 size variations; ¼" O.D. up. N.C. threads; class 2 fit.

LOW COST...Saves hundreds of dollars annually in toolmaker's time!

NO MARRING...Rotation of pad ceases at first touch against the work! Soft seat saves surfaces!

HEX SOCKET HEAD...for easy hex key adjustments!

BLACK AS THE ACE OF SPADES! Completely rust proofed end to end!

KEEP VLIER SCREW-BALLS IN STOCK FOR INSTANT USE—SAVE YOUR TOOLMAKER'S TIME!

Ask your Vlier Distributor for an assortment of sizes today!

VLIER ENGINEERING INCORPORATED

MONEY-SAVING TOOLING SPECIALTIES FOR EVERY REQUIREMENT!

TORQUE THUMB SCREWS— Apply accurate, controlled end pressures; eliminate distortion to the workpiece. 4 models; 19 sizes!

VLIER SPRING PLUNGERS— For use wherever accurate, positive spring loads are needed! 4 models; 40 sizes!

VLIER SPRING STOPS— Provide end pressures in fixtures when wall sections are not available. Two models: 14 and 32 lbs. end pressure.

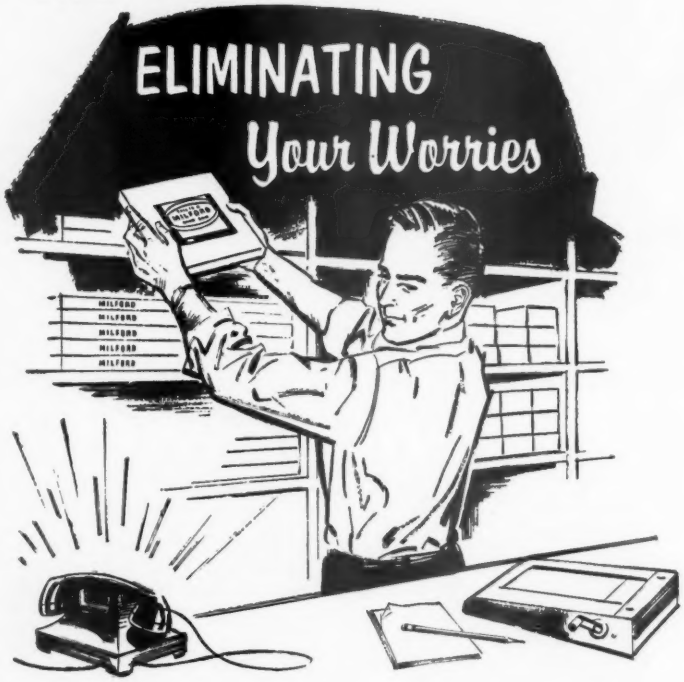
VLIER TOGGLE PADS— Assure solid clamping of parts with uneven or off-angle surfaces. 5 sizes; fit almost any clamp.

VLIER FIXTURE KEYS— New 5-Way Key fits every standard mill table slot. 3-Way model also available.

Write for your complete catalog of Vlier products today! It's free!

HIS JOB...

ELIMINATING Your Worries



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- BETTER SERVICE
- SIMPLIFIED INVENTORIES

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MILFORD Distributor

Product superiority is important . . . and we spare no detail in design, development or manufacture that will make MILFORD Blades cut metal faster and more accurately at lower cost. We must also make sure the right MILFORD Blades for your metal cutting jobs are quickly and conveniently available when you need them. That's why MILFORD Blades are offered exclusively through selected Industrial Distributors.

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Saw Blade Specialists for Over 75 Years
NEW HAVEN 5, CONNECTICUT

MILFORD

Profile Blades and Band Saw Blades, Hand and Power Hack Saw Blades

CIRCLE INFORM-A-GRAM KEY NO. 44

★ ★ ★ ★ ★ ★ ★ ★

Talk of the Month

★ ★ ★ ★ ★ ★ ★ ★

Reduction of The Manufacturing Cycle*

by Roland T. Nelson
Production Manager
NORTON COMPANY
Worcester, Mass.

In our over-all desire for reducing total costs, there is no question that the many techniques for reducing overhead costs have not always received proper attention. Too often, we apply a concentrated effort to the reduction of direct costs in our product by (1) investigating faster and more efficient ways to cut metal, (2) improved tooling applications, and (3) changes in material. Surrounding these endeavors are countless opportunities to reduce overhead or indirect costs but which very often are unchallenged because of their apparent inconsequential nature. To believe that they are inconsequential is a mistake. We seem to overlook areas of indirect costs even though they represent 25 to 50% or more of our total costs. Probably this is due to the discouragement of dealing in the seemingly complex problems of red tape where people are always ready to say that you can't change a system or procedure because "We have always been doing it this way."

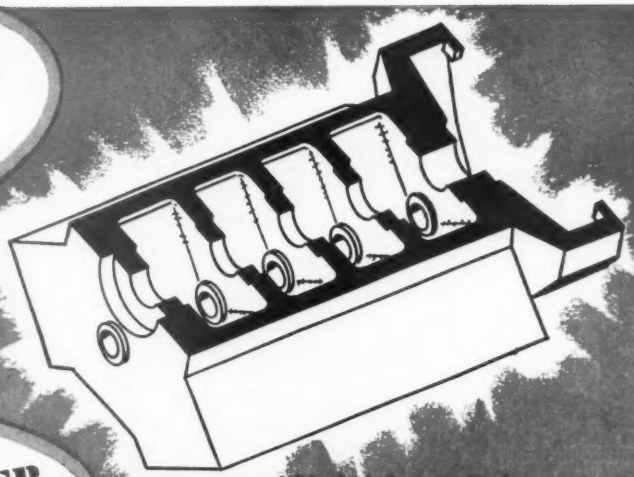
A typical example of reducing the manufacturing cycle in a small but significant way was the case of processing sales checks

. . . *Continued on page 48*

* Last month the American Management Association held a special two-day Manufacturing Conference in Cleveland. The sessions were devoted exclusively to the single problem area of "Reducing Production Overhead". With much attention paid to direct costs, AMA recognizes that overhead or indirect costs have been mostly left to chance. One of the features of the AMA Special Manufacturing Conference was Mr. Nelson's talk on Norton Company's accomplishments. We commend it to our readers.—E.W.P.

CUSTOMER SPECIFIED

To increase production of V-8 engine blocks, a large automotive manufacturer specified a close tolerance, production milling machine for rough and finish milling of pan rail face and bearing locks.



Solid color indicates machined surfaces on V-8 engine block

KEARNEY & TRECKER DESIGNED

Kearney & Trecker designed this six-spindle production milling machine as the answer. It does continuous rough and precision finish milling to .001" accuracy. Three front spindles perform rough milling. Three rear spindles handle finish milling. Close tolerances are essential because all later machining depends on this machine's accuracy. A rapid-action hydraulic locating and clamping fixture is another outstanding feature.

For more details on the machine illustrated ask for Data Sheet No. 1048. Free booklet "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking.

New production efficiency starts with Kearney & Trecker production machines

This typical example proves you can reduce costs and start on the road to higher production with machines designed and built by Kearney & Trecker's Special Machinery Division. With more than 50 years' experience in machine design and manufacture, Kearney & Trecker has all the ingenuity and skill required to solve special machining and production problems.

Why don't you take advantage of our abilities? They can pay off in profits for you. Your Kearney & Trecker Special Machinery Division representative will be pleased to give you all details. Call him today!

Builders of Precision and Production Machine Tools Since 1898

CIRCLE INFORM-A-GRAM KEY NO. 45

You asked for it . . . here it is

A SUPERIOR CARBIDE FOR STEEL MILLING

Now you can get what has been long needed . . . a sintered carbide produced specifically for steel milling cutter purposes, exhaustively tested and *proved* to be superior to any grade previously available.

The *new* FIRTHITE TXL definitely increases the volume of metal removed in mass production operations, materially reduces unit costs—through uniform performance from remarkable strength with higher wear and crater resistance.

FIRTHITE TXL is not just a new grade designation for a "hopped up" existing grade. It is a completely new combination of materials and processes painstakingly worked out in Firth Sterling research laboratories and pilot plants to do *one job better than it has ever been done before.*

How well it succeeds is shown in the results of carefully controlled field tests at right.

Write for technical bulletin and prices today.

TESTED AND PROVED SUPERIOR

Firthite TXL, through exhaustive tests in both Firth Sterling laboratories and in the field, has given superior performance. In a recent test by a prominent Midwestern milling cutter manufacturer, Firthite TXL, against ten competitive grades, proved superior in all cases and showed from 25% to 55% less wear at 5 cuts and 23% less wear at 20 cuts. Six grades were worn beyond repair before the test was completed.

The test was conducted under severe breakdown conditions on a 10" milling machine using a 6" R.H. cutter with one tooth . . . 1" square with 1/32 corner radius. The material used was SAE 1020 normalized forged bar steel which was climb milled at 1375 S.F.P.M. with 4⅝ inches per minute feed resulting in approximately .0053" chip load. Depth of cut was .050" and overhang of work was 3".

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—INC—

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9-300

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

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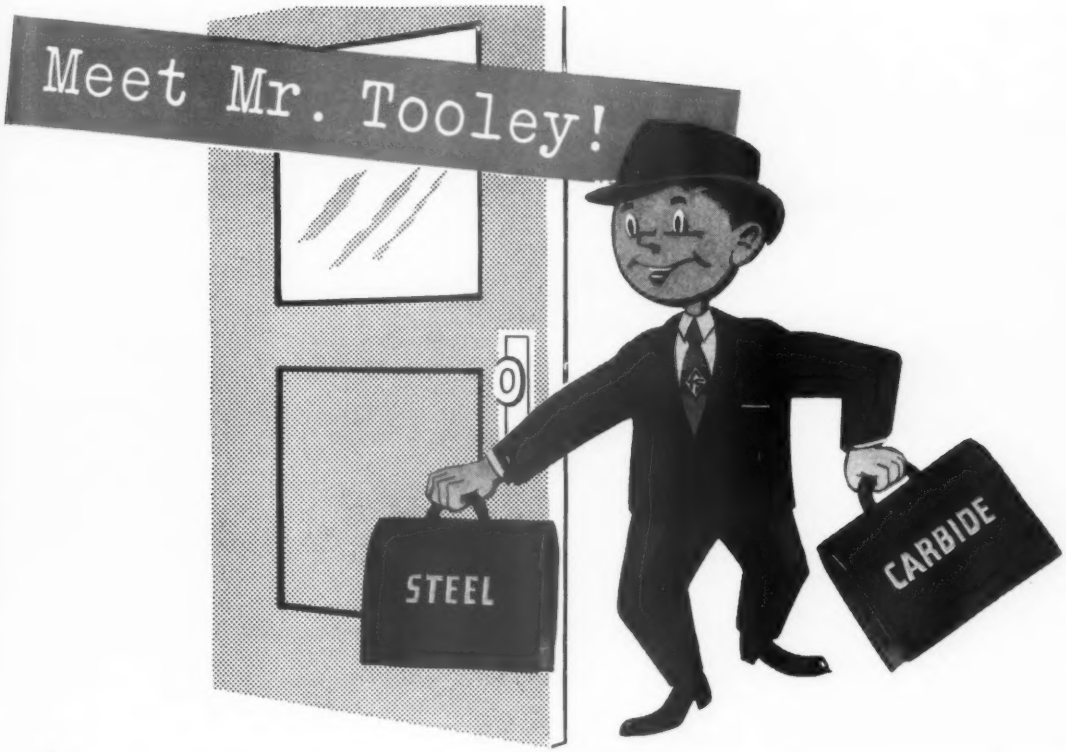

AMERICA is a land of symbols. The things we use and eat and wear, the services rendered to us, are often better known by their symbols than by their generic product names.

From Sunny Jim of yesteryear, who put packaged cereal on America's breakfast table, to Reddy Kilowatt who dramatizes electricity . . . "trade" symbols and characters have become loved and respected as representing reliability, versatility and often uniqueness.

Our Mr. Tooley is such a *symbol* to all industry where tooling for production is so important that it may even mean the difference between profit and loss.

For Mr. Tooley typifies the *unique* position that Firth Sterling occupies among producers of tools and tooling materials . . . that of making and selling *both steels and carbides* . . . the *right* steel or carbide or the exact combination needed to do each job best . . . from a single manufacturing source.

Thus Mr. Tooley has taken his place among American trade characters symbolizing a service of *greater* value built on Firth Sterling's ability to make *unbiased* recommendations and capacity to furnish *complete* shop tooling needs.

Firth Sterling

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PRODUCTS OF FIRTH-STERLING METALLURGY

High Speed Steels
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Stainless Specialties
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FREE!

NEW 48-PAGE CATALOG to help you select the RIGHT TOOLS and TOOLING MATERIALS

You'll find this catalog valuable in selecting proper machining materials: carbide standard tools, tips, inserts, blanks; steel toolholder bits, drill rod, ground flat stock. Get your copy from your Firth Sterling distributor or write direct.

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R-302

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Please send me the new 48-Page Firth Sterling Catalog.
I am particularly interested in: ☐ Steel ☐ Carbide

Name_____
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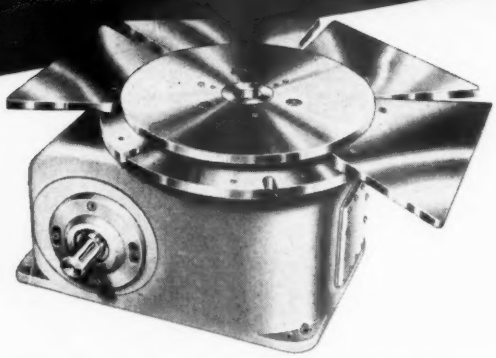
STANDARDIZED AUTOMATION!



Ferguson STANDARD INDEX TABLES FOR HIGH SPEED PRODUCTION

The Ferguson INTERMITTOR offers

★ *Over 150 Standard Models*
★ *Ease of Installation and Tooling*
★ *30,000 Precision Pieces Per Hour*
★ *Lower Maintenance Requirements*

Cut production costs with the new FERGUSON Intermittor, the standard index table that features *high speeds* with *smoothness* of operation; extreme *precision* with no shock-causing auxiliary locking or locating mechanisms; up to 20,000 hours operation with *no maintenance* and complete drive renewal merely by replacing inexpensive ball bearings.

The Intermittor gives you complete choice of profitable work time with a minimum of "wasted" rest during the cycle because movement time may vary from 25% to 75% of the total cycle time. You get more pieces per hour . . . at less cost per piece.

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Manufacturers of the Ferguson Trans-o-Mator, Ferguson Roller Gear Drives, Dial Feed Index Tables, Roll Feeds for Presses, Special Cams, Special Purpose Machinery.

FERGUSON MACHINE & TOOL CO., INC.

ROLLER GEAR DIVISION, DEPT. HI-2 P. O. BOX 191, ST. LOUIS 21, MO.

CIRCLE INFORM-A-GRAM KEY NO. 48

. . . Month's Talk, from page 44

for parts orders. You are all faced with the problem of having your Order Dept. write up a sales check from some customer's purchase order so that you might translate his wording into your proper catalog specifications or part numbers. When this sales check is finished, it is usually passed on to the Planning Dept. to be reviewed for inventory, ordering, scheduling, typing of requisitions, rechecking, and then sending the requisitions to the Stores Dept. for disbursal.

In our business, we ship over 60% of our parts orders from stock. Our old procedure meant that over 60% of our customers were waiting for us to process paper work, when actually the parts were available for shipment in our Stores Dept. Now we send the sales order to the Stores Dept. immediately after it is typed in the Order Dept. This sales order carries the same authorization for disbursal of material as a requisition. When the order has been filled, the sales order is then sent to the Planning Dept. for the proper paper work. This means that we are carrying out our planning routine after the parts are actually in transit to the customer.

That is a simple but effective answer to a problem that many of us have. We reduced the stock-shipping cycle by more than half. This same type of thinking can be extended to more elaborate and expensive transactions, even for complete machines of a standard or stock nature where delivery is of prime importance, and where the paper work can be completed at a later date.

Very likely, all of us have procedures for issuing purchase orders following authorization to order the many components required for our products. This purchase order usually cannot be issued until all planning work is done, requisitions made out, and then purchase orders made out from these requisitions. Our complete planning routine for the release of a $1 million inventory schedule usually takes two to three weeks. Instead of ordering the material as the final step in the planning procedure, purchase orders are actually issued as one of the first steps. Our purchase orders are in the form of a tabulating machine card, and are duplicates of the authorization card

. . . Continued on page 50

Less Idle Time
WITH
MOTO-TRUC*

* To make an investment in a lift truck is one thing . . . to make it *pay* is another. The amount of idle time logged against a truck is a major factor in whether a truck is "paying its way."

MOTO-TRUCS offer *LESS* Idle time because of simplified operator controls. Their patented *Roller Grip Controls* make it easy for practically anyone in your plant to operate the truck . . . and remember . . . There's a MOTO-TRUC for every purpose.

Simplified Roller Grip Controls

Send for Bulletin No. 54

MOTO-TRUC Designers FOR THE INDUSTRY PATENTED

The MOTO-TRUC Co.

Representatives in Principal Cities

1990 E. 59th St. • Cleveland 3, Ohio

Pallet . . . Platform . . . Hi-Lift Trucks

LARGEST EXCLUSIVE MANUFACTURER OF "WALKIES"

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only 1 adjustable GAGE needed for

. . . A light precision gage with a range of 0" to 6¾"

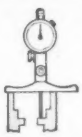
Write for complete Catalog

GROOVE LOCATION

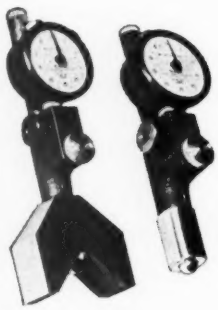
. . . Checks to either top or bottom of groove.

HOLE DEPTHS

. . . Replaces conventional flush-pin gaging.



SLOT DEPTHS

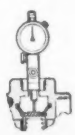


Models available for checking countersinks.

. . . Gages deep and narrow slot depths.

SPECIAL APPLICATIONS

. . . Adaptable to checking part assembly dimensions.



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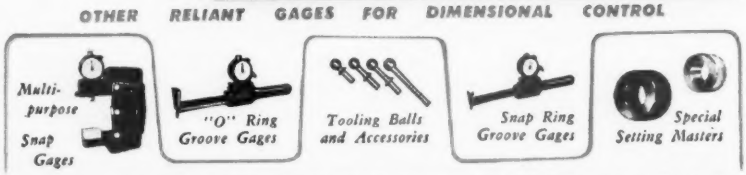
OTHER RELIANT GAGES FOR DIMENSIONAL CONTROL



PRECISION GAGING EQUIPMENT

CIRCLE INFORM-A-GRAM KEY NO. 50

. . . Month's Talk, from page 48

for originally ordering the item. As a result, they become available within a week after release of the stock schedule for ordering. It was found that merely by rearranging various office routines that some vital work, such as the purchase of material and even the manufacture of parts, can be accomplished while paper work, which is required at a later date, is being done.

In our old type of manufacture, a seven-operation job was processed through seven different departments, whereas now the seven operations are done in one department. Jobs are started and finished in the same line, except in a few cases where it might be necessary to have an operation done in the adjacent line. We have estimated that our travel or trucking distances in the plant have been cut from 50 to 90% on parts. We have glaring examples where parts that formerly traveled 5,200′ by our old method have been reduced to 1,280′.

Our five lines of manufacture formerly represented eight departments which were serviced by six tool cribs. We now have two tool cribs for these five lines where we can more efficiently store and service tools with less people. This does not include the savings which we are realizing by setting up a pool of common and standard cutting tools, which allows us to purchase replacements and original orders at quantity discount savings. By combining eight departments into five lines and with a better layout of machinery, we have decreased our utility labor by 25%. Utility men are responsible for the movement and handling of material and tools within the various manufacturing departments. Also, the more systematic flow of material has allowed us to reduce our inspection force by 20% and our storekeeping personnel by 5%. The more efficient layout has also allowed us to reduce the supervision force by 15%.

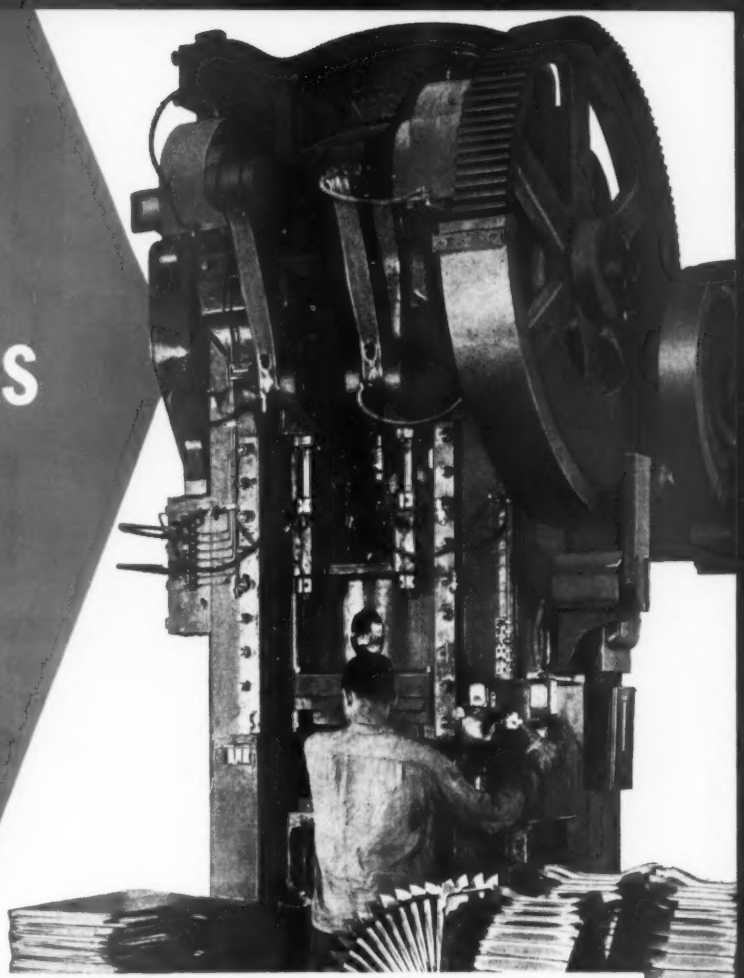
We have found that one of the best measures to take in an effort to reduce the manufacturing cycle concerns the release of production orders to the factory. We usually have from 8,000 to 10,000 production orders in the plant at one time. This is a sizable quantity of orders for only 300 employees in our parts manu-

. . . Continued on page 54

95% of our presses are BLISS

that's why we're "quick on the draw" at BROIL-QUIK

Broil-Quik's famous Super Chef.



Bliss 3¾ Toggle press cuts and deep draws (to 2 1/16") 1600 Broil-Quik side panels per shift from 0.028" cold rolled steel blanks.

"In our fiercely competitive business, we have to have speed, dependability and little or no downtime," says John Simone, Superintendent. "With Bliss, we get it ... and more to spare. *That's why 95% of our presses are Bliss.*"

After consulting with Bliss engineers, Peerless Electric, Inc., New York, N. Y., makers of Broil-Quik rotisseries, chose the *right* presses for the jobs at hand—

- Bliss 28½ Inclinables—with their adaptability, rugged gap-frame construction and fast, dependable clutch operation—to draw and pinch off steel and aluminum blanks from 0.025" to 0.080" thick.
- And a Bliss 3¾ Toggle Draw press—with powerful blankholding pressure and rugged frame—to deep draw cold rolled steel blanks 0.028" thick.

Like Peerless, thousands of pressrooms are predominantly Bliss. For the fact of the matter is this: there are more Bliss presses in use today than any other make.

Chief among the reasons for this century-old standing is (1) Bliss makes more types and sizes of presses than any other builder; (2) Bliss "grinds no axe" for any one type. As a result you can be sure of impartial counsel from a Bliss engineer—you can count on him to help you pick the *one* right press for the job. Next time, do as thousands do, call Bliss first.

BLISS
SINCE 1857

is more than a name . . . it's a guarantee

E. W. BLISS COMPANY
CANTON, OHIO
PRESSES, ROLLING MILLS, SPECIAL MACHINERY

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U. S. Plants in Canton, Salem and Toledo, Ohio; Hastings, Michigan; and San Jose, California. *Branch Offices* in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. *Other representatives throughout the world.*

In development for three years . . . formulated by leading carbide engineers . . . produced in the newest plant by the most modern equipment . . . tested on long runs by the country's leading carbide-using plants . . . Valenite is the "CONSTANT QUALITY" TUNGSTEN CARBIDE for your production line.

Made right for modern hi-speed production, Valenite's "CONSTANT QUALITY" performance cuts down-time, saves money.

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Write for your complete Valenite tips and tools catalog.

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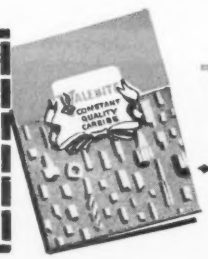
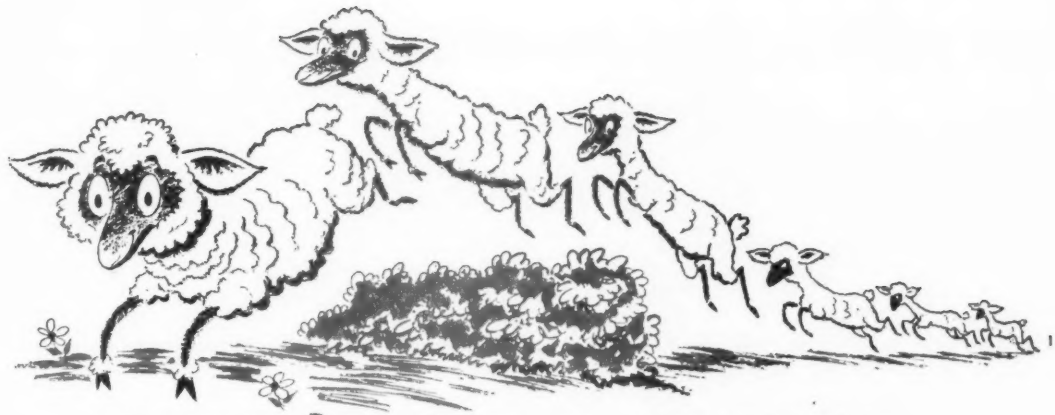


VALENITE
METALS CORPORATION
Box 205 • Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 52



DON'T BE A SHEEP WHEN BUYING GAGES!

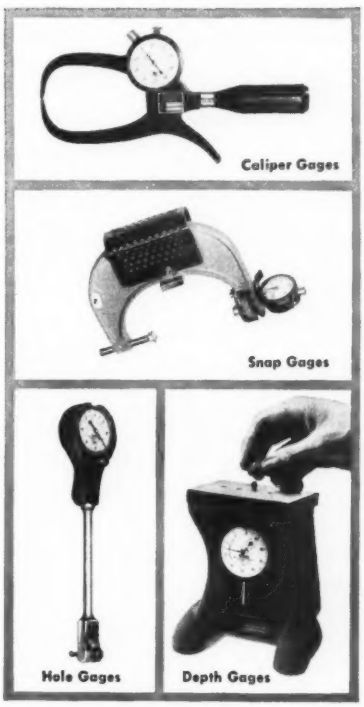
You can go far astray following a "FAD"

It's fashionable today to buy costly, complicated gages for even simple gaging requirements. Sure, we like to sell expensive gages, but we don't think it's good business to sell such gages when simple gages will do. Perhaps an Indicator Gage does require a little operator care but it's still the most economical when a few instructions are given on its proper care and use. And after all, its accuracy is entirely adequate for most applications.

Consider a few of the advantages of using Indicator Gages where these will perform the job: Each gage is a complete package — there are no extra appurtenances to buy and maintain. No wires and hoses to drag and tangle. No accessories to lose, no airlines to keep clean. It is simple to operate, simple to maintain. Its purchase price is low, as is also its maintenance cost. In addition, the greater range per unit, and its greater flexibility, permit an Indicator Gage to perform far more operations than an excessively accurate and complicated gage so fashionable right now.

Ask for our complete catalog.

Federal Products Corporation
5232 **Eddy Street, Providence 1, R. I.**



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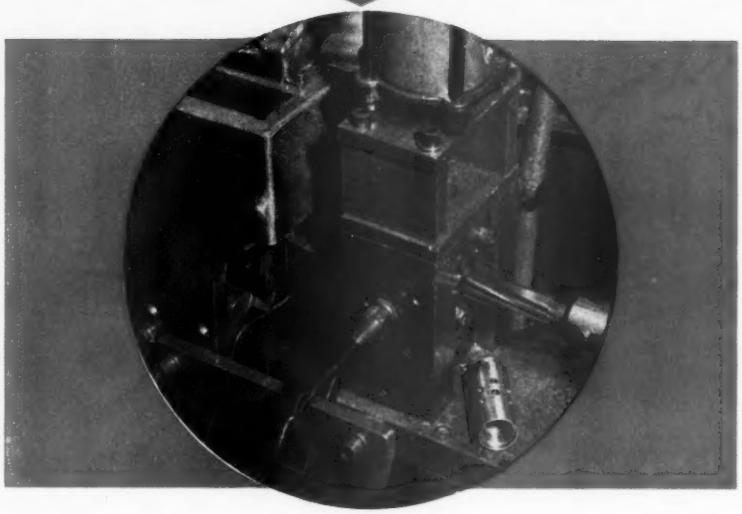
HIGH SPEED W&B REAMERS . . .



More Production • Less Resharpening

Shown above is the automatic reaming of fin assemblies for 60 M.M. mortar shells at Columbia Electric Products Company, Spokane. Standard Whitman & Barnes high speed reamers are used to remove the heavy burrs of 16 radially drilled holes in each piece. The reamers are operated at 800 R.P.M. and the production rate is 1,500 pieces per hour. The outstanding performance of these W & B reamers is evident in the fact that Columbia Electric obtains 11,000 reamed fin assemblies per grind. For better reamer performance—specify W & B.

Call your W&B distributor for best service and highest quality

He can save you money by supplying from his stock . . . what you need when you need it!

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CIRCLE INFORM-A-GRAM KEY NO. 54

. . . Month's Talk, from page 50

facturing sections, and strongly points out the type of small-lot-size operation that we have. We attain our large production volume by a tremendous variety of products rather than by long runs of fewer items.

If we were to release all production orders to the factory as soon as they became available, the total load of orders in the factory would be 25% higher. We operate on a release-file basis, and release to the factory only those production orders which must be released if all the operations are to be completed by the scheduled finish date. Let us assume that two production orders are ready for the factory with 12 operations on one job and 7 operations on the other. Both must be finished for the Assembly Dept. at the same time. There certainly is no reason to release the 7 operation job as soon as the 12 operation job. We feel that the release dates calculated in our dating system are equally as important as the finish dates, or the individually dated operations along the line. If you release all production orders when they become available, you only clutter up the shop with a number of jobs that are not required for the immediate work load. This causes confusion and delays, requires more material to be jockeyed around, and opens up the opportunity to work on orders that aren't required while other jobs become overdue. Straight-line flow is more than just talk. It must be done with good, sound scheduling. It is extremely important to release work in the proper sequence by required dates with due consideration for the number of operations to be completed by the factory personnel. The faster the work moves in and out of the organization, the sooner your invested money is returned to you.

Actual practice proved us to be right since we are now operating on a manufacturing cycle which is one month and a half to two months less than our old method.

For Your Future

BUY U. S. SAVINGS BONDS

POP'S school of Filing

"Whaddya want to know about files and filing? Ask Pop —that's me"

"POP the Foreman" is the likeable yet serious-minded imaginative character who for many years has been a "spokesman" for Nicholson through the pages of this and other leading industrial magazines.

"Pop" speaks the conscientious industrial foreman's language on the use, care and selection of files. And being deeply interested in the success of those who employ men like himself, he has a lot of sage thoughts and suggestions that will prove helpful to efficiency- and economy-minded industrial managements.

So the following three pages are turned over to "Pop," who does some interesting "ghost writing" under our sponsorship and supervision.

Nicholson believes in and has for 40 years adhered to the principle of selling to Industrial Users only through Industrial Distributors. As a result, these Distributors and their field men learn how to WORK FOR YOU. They become experts on files and filing—right down into your shop where the right use of THE RIGHT FILE FOR THE JOB counts in the way you want it to count. There are in the U.S. more than 875 near-at-hand Industrial Distributors of Nicholson and Black Diamond files.

REPRINTS of this instructive 4-page advertisement may be had for the asking. How many copies? Write to Nicholson.

3 MORE PAGES

NICHOLSON FILE COMPANY

PROVIDENCE 1, R. I. (In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ont.)

Heavy Filing

USE THE RIGHT FILE FOR THE JOB

Pop says: "Actually there are *thousands* of kinds, cuts and sizes of files. That is because there are thousands of *different* filing jobs, each of which can be done better by using *the right file for the job.*

"Therein lies the first rule on 'How to get the most out of files.' From the roughest cast-iron filing job (as in the illustration above) to delicate die or fine-instrument finishing (see picture below), the right file enables doing the job properly, whereas the wrong one does not — and often, in fact, ruins the work. The right file saves time because it performs correctly, and usually faster, on the kind of metal or work for which it is designed. The right file permits a greater number of efficient filing strokes — per file and per file cost.

"Many factors enter into the selection of *the right file for the job.* In general, different files are required: (1) to file a flat or convex surface; (2) to file a curved or concave surface; (3) to file an edge; (4) to file a notch, a slot, or a square or round hole.

"But these factors can become complicated by hundreds of combinations with additional factors, such as: (1) the kind of material to be filed; (2) the kind, shape and hardness of the object to be filed; (3) the location, size and character of the surface; (4) the amount of metal to be removed; (5) the degree of smoothness or accuracy required. Therefore, selecting exactly the right file for any particular combination is no easy task. Experience is a good guide—but a slow teacher. However, with the aid of 'File Filosophy' (see last panel), no mechanic need be far off the track to *the right file for the job.*"

Precision Filing

Right Filing

USE THE RIGHT *FILING METHOD*, TOO

Pop says: "Filing is an industrial art. Grip, stroke and pressure must 'fit the job,' and the kind of file used.

"FILING ACTIONS. (1) *Straight filing* consists of pushing the file lengthwise —straight ahead or slightly diagonally— across the work. (2) *Drawfiling* consists of grasping the file at each end and pushing and drawing it laterally across the work. (3) *Lathe filing* consists of stroking the file against work revolving in a lathe.

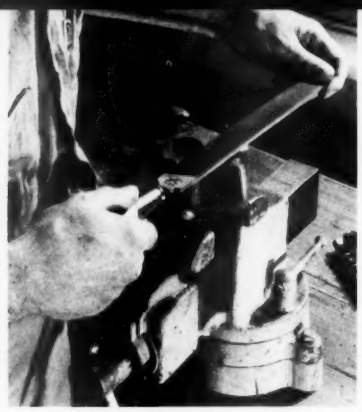
"VISE FILING. For general filing, vise should be at about elbow height; somewhat lower for continuous heavy filing; nearer eye level for delicate work. When necessary to prevent vise-pressure marks, a pair of soft-metal 'protectors' should be placed between the vise jaws. For holding and protecting round pieces, grooved hardwood blocks are sometimes used.

"GRASPING AND 'CARRYING' FILE. In most two-hand filing operations, handle grasp should be 'full' with thumb lying parallel along the top. Point of file is usually grasped by the thumb and first two fingers of other hand, with thumb on top and approximately in line with file. For the lighter strokes, thumb and fingers should be moved toward right-angle position according to pressure required.

"To prevent 'rocking' in flat-surface filing, file should be carried forward in almost a straight line—changing its course just enough to prevent 'grooving.' Apply just enough pressure to keep file cutting and prevent 'slide.' On back stroke lift file clear on hard metals; and with only file-weight contact on soft metals."

NICHOLSON U.S.A.

Wrong Filing



FILING ROUGH CASTINGS

Pop says: "Snagging castings—removing fins, sprues, and other projections—is very rough work and mighty tough on ordinary files. Their teeth are designed for sharp, fast cutting and therefore do not possess the ruggedness to withstand the shock when driven under pressure against hard projections or sharp edges. Filing of this sort engages only a few teeth at one time, thus putting a severe strain on each.

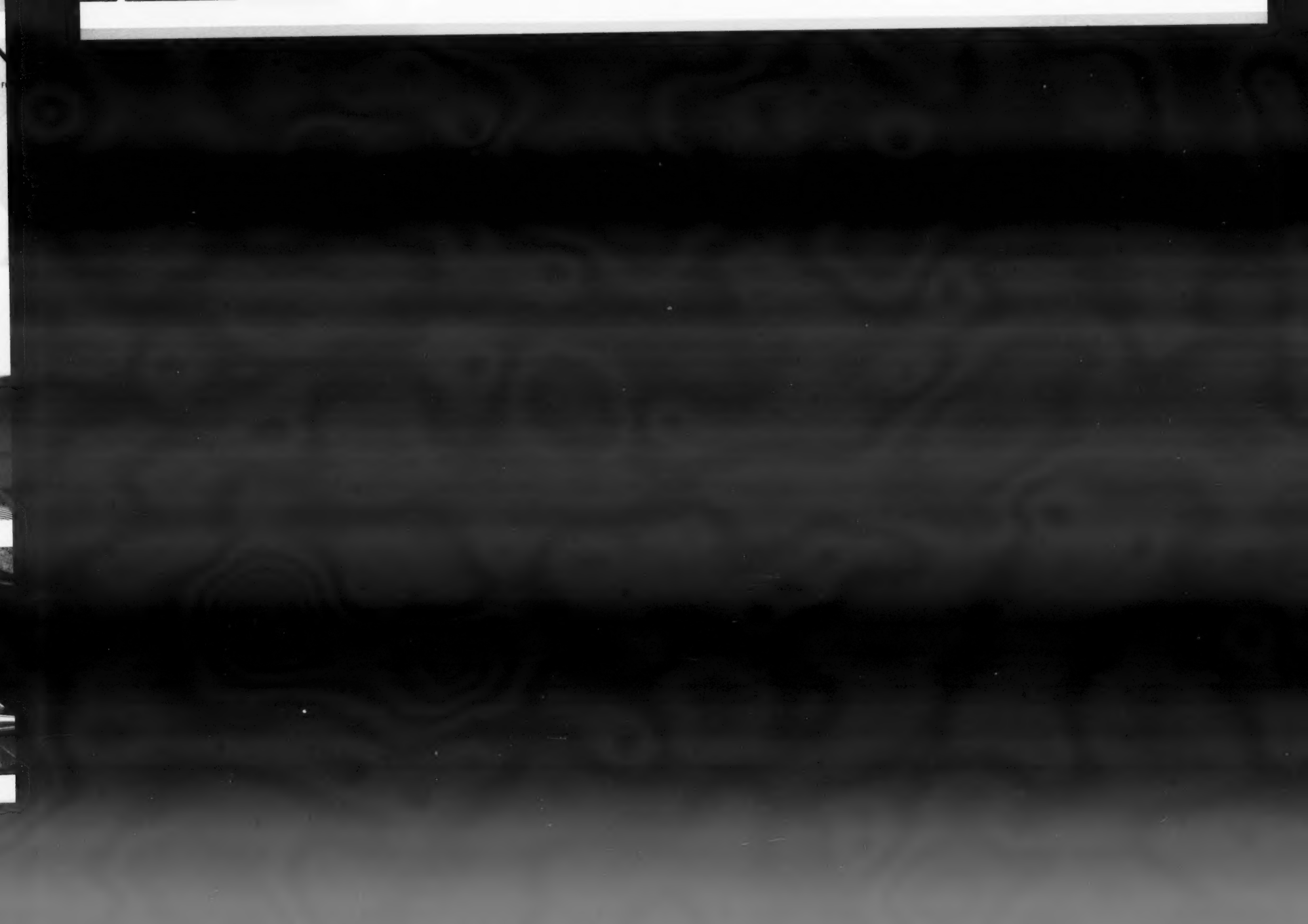
"So, for such work it is best to use a special Nicholson or Black Diamond Foundry file whose teeth are sturdier and have heavy-set edges—to resist shelling or breaking out. While not expected to possess the cutting speed of ordinary files, Foundry files have much longer efficient life on the kind of filing for which they are designed. (Foundry files are also widely used for filing sharp corners of dies.)"

FILING STAINLESS STEEL

Pop says: "The tremendous increase in the use of stainless steel and similar alloy steels has created a new and distinct filing problem. The hard chromium and nickel content of these steels makes them extremely tough and dense. This causes them to have an abrasive action that tends to shorten the life of the general purpose file.

"Nicholson research has overcome this problem with a special file for such steels. It has exceptional wearing qualities. Properly used with light pressure and a slow, steady stroke, this new file removes metal rapidly, requires but little effort and leaves a good finish."

Foundry File ***Stainless Steel File***



FILING SOFT METALS

FAST FILING. Pop says: "Take aluminum, a soft, ductile and malleable metal. It is difficult to file with ordinary files because their teeth soon become clogged. For cutting aluminum rapidly, yet leaving a good finish, the Nicholson or Black Diamond Aluminum 'Type A' file is a recent development for: (1) filing the roughness from aluminum castings; (2) filing sheet and bar aluminum; (3) filing aluminum alloys.

"The upcut of this file is deep with an 'open-throat'; the overcut fine, producing small scallops on the upcut to break up filings, allow file to clear itself, overcome chatter and prevent taking too large a bite.

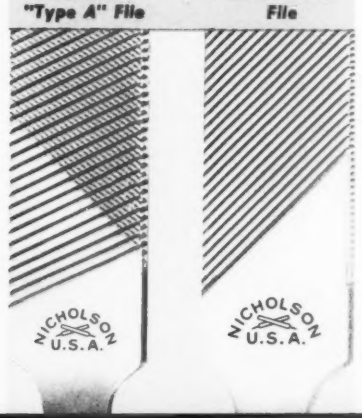
"Aluminum 'Type A' file is shown below at left."

SMOOTH FINISHING. Pop says: "For soft metals like aluminum, brass, copper, and even plastics, hard rubber and wood —there is a special Nicholson or Black Diamond file called the Shear Tooth which combines fast material removal with excellent finishing qualities. The combination of coarse single cut and long teeth angle of this file provides a smooth shearing action; also minimizes clogging.

"To overcome this file's tendency to run toward the left, it should be used with a somewhat diagonal stroke toward the right. The Shear Tooth is shown below at the right."

NICHOLSON U.S.A.

Aluminum "Type A" File | *Shear Tooth File*



LATHE FILING

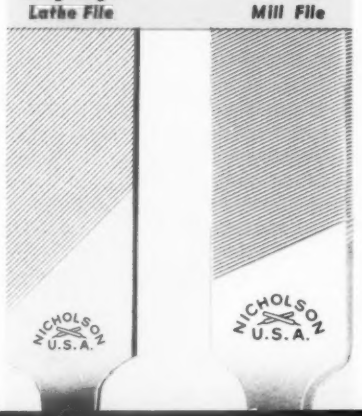
Pop says: "While the ordinary Mill file is normally capable of doing good lathe-filing work, there is a special Nicholson or Black Diamond Long Angle Lathe file with teeth cut at a much longer angle. It provides cleaner shearing and self-clearing; eliminates drag or tear; overcomes 'chatter'; reduces clogging. It is very fast-cutting and produces a fine silken-smooth finish. Its 'safe' (uncut) edges protect any work-shoulders not to be filed.

"Lathe filing is most commonly employed for shaft fitting. High spindle speed should be used; and where stock to be removed is considerable the 12" or 14" size is preferable. For an extra-fine, highly polished finish a Nicholson X.F. Swiss Pattern Hand or Pillar file in No. 4 or No. 6 cut may be used with very good results.

"In using the Long Angle Lathe file, care should be taken at shaft ends and shoulders, as this fast-cutting file may easily cut too deeply at such points. It is also important never to run the hand over the work in the lathe, as accumulated oil and moisture will sometimes coat the work and make it difficult for the file to take hold again.

"In lathe-filing work that is oval, elliptical or irregularly rounded, the finer or lighter cutting Nicholson X.F. Swiss Pattern files will be found most satisfactory. They are made in a wide range of shapes, sizes and cuts. Long Angle Lathe file (left) is shown below in contrast with ordinary Mill file (right)."

Long Angle Lathe File | *Mill File*



PRECISION FILING

Pop says: "Die and pattern making, model building, precision-instrument making and repairing have gained tremendous impetus in aircraft, automotive, engine, machine-tool and other rapidly expanding industries. All these—to say nothing of the long-established watch, clock, jewelry and kindred industries—require precision files of innumerable shapes, cuts, sizes and purposes.

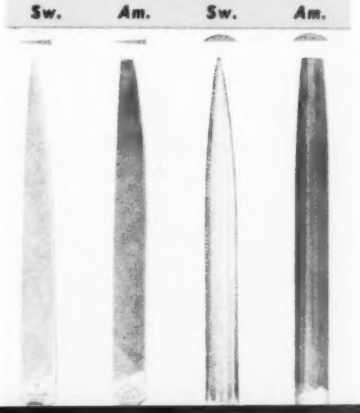
"While for many kinds of work regular files are all that are required, Swiss Pattern files—made to very exacting measurements and finer cuts—are necessary for the more particular purposes mentioned above.

"In precision filing all the elementary rules for general filing apply. The flat precision files should be used with a slow, smooth action, with the forward stroke moving the file laterally along the work. In using the round or half-round types, the file should be turned clockwise as the stroke is made, to assure a deeper cut and a smoother finish.

"There are many instances — in model and fine-instrument making, for example —where intricate fit-filing is necessary on small forms of wood, plastics or other non-metallic materials. Swiss Pattern files are perfectly adequate for such purposes, provided they are used while sharp and kept clean with a file brush. Contrasting views of typical American and Swiss Pattern files are shown below. By the way, Nicholson X.F. (meaning Extra Fine) Swiss Pattern files are the largest line of their kind in the world."

TRADE X·F MARK

Sw. | *Am.* | *Sw.* | *Am.*



FILING FLAT AND CURVED SURFACES

Pop says: "Milled Curved Tooth files cover a distinct filing field and have a considerable range of shape and structural characteristics. Unlike the chisel-cut teeth of regular files, these curved file teeth are *milled* in with a precision that gives them almost 'razor sharpness.'

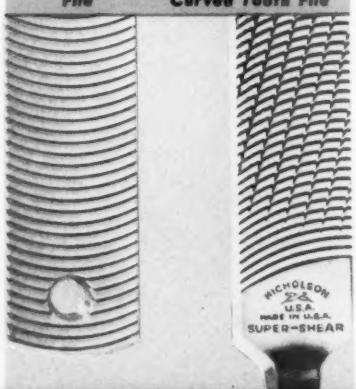
"Curved Tooth files are widely used in the automobile manufacturing and repair industries for work on aluminum and sheet steel (on flat or curved surfaces). They are also used on such soft metals as brass and babbitt, and often on iron and steel in general. Because of their curved teeth they readily clear themselves of chips and have the correct rake for speed and economy.

"Nicholson Superior Curved Tooth files are made in both Rigid and Flexible forms —the Rigid, either tanged for the conventional handle or plain (with hole at each end) for special holders; Flexible, plain only—for use in special holders on concave surfaces. Standard, Fine and Smooth cuts; in parallel Flat, Square, Pillar, Pillar Narrow, Half Round, Shell and Moulding types.

"A special Curved Tooth file is the Super-Shear. Exclusive with Nicholson—its teeth, divided by angular longitudinal serrations, are cut in an 'off-center' arc. This gives them virtually a right angle and wide gullet toward one edge — for fast cutting; also a longer, shearing angle and narrow gullet toward the other edge—for smoothing. Practically two files in one!"

NICHOLSON U. S. A.

Plain Flexible Curved Tooth File | **Super-Shear—Special Curved Tooth File**



THE CARE OF FILES

Pop says: "File life is greatly shortened by improper care as well as by improper use—and improper selection. Some useful 'Do's' and 'Don'ts' are offered here:

"Files should never be thrown into a drawer or tool box containing other tools or objects. They should never be laid on top of or stacked against each other. Such treatment ruins the cutting edges of their teeth.

"Keep files separate — standing with tangs in a row of holes or hung on a rack by their handles.

"Keep files in a dry place so rust will not corrode their teeth points.

"It is also of great importance to keep files clean of filings or 'chips,' which often collect between the teeth during use. After every few strokes the good mechanic taps the end of the file on the bench to loosen these 'chips.'

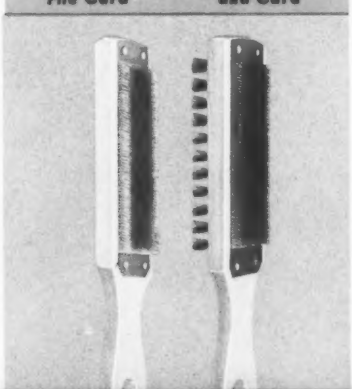
"The filer should also have on hand a file card or brush. With it the teeth of the file should be brushed frequently — and always before putting the file away.

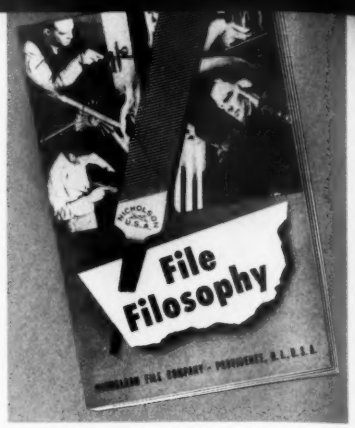
"To remove obstinate 'pinnings' which sometimes clog up the teeth and cause scratches on the work, a 'scorer' made of soft metal is often a further help.

"Oil or grease on files should be removed with chalk.

"File card (left, below) is for more general use. File brush and card (right, below) is used especially on the finer cut files."

File Card | **File Brush and Card**





"FILE FILOSOPHY"— FAMOUS NICHOLSON BOOK ON FILES AND FILING

Pop says: "And the foregoing isn't the half of it! It's just some samples of the things Nicholson's *new 50-page edition* of 'File Filosophy' tells about.

They are also typical of the subjects used by Nicholson technical specialists available for meetings and slide-illustrated lectures through arrangements with Nicholson's Industrial Distributors.

"Further discourses, descriptions and illustrations on files and filing cover such subjects as:

- **A Bit of File History**
- **Important Steps in File Making**
- **File Kinds, Shapes, Cuts and Cross Sections**
- **Mill and Other Types of Saw Files**
- **Machinists' Files**
- **Rasps**
- **File Terminology**
- **More About Special Purpose Files**
- **More About Precision Filing (Swiss Pattern Files)**
- **More About Milled Curved Tooth Files**
- **Hand, Band, Circular, Crosscut and Other Saw Filing**
- **Saw Chain Filing (a new chapter)**
- **Sharpening Tools and Implements**
- **Rotary Files and Burs (a new chapter)**

"Let me send you this 'mechanics' textbook.' Every industrial production head, purchasing agent and tool keeper should have a copy. Just write to 'Pop,' care of Nicholson File Co., 23 Acorn Street, Providence 1, R. I."

NICHOLSON FILE CO.

PROVIDENCE, RHODE ISLAND

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON U. S. A.

BLACK DIAMOND MADE IN U.S.A.

New facilities mean . . .

DIECO's famous die sets now available in KING-SIZE too!

As a subsidiary of E. W. Bliss Company, we are able to use their virtually unlimited machining facilities for the production of "giant" die sets.

With these facilities we can produce the largest die sets in use today.

What is more important, however, is that Dieco takes the same pains with large die sets as with the small: holes are precisely bored, pins and bushings fitted and aligned with care, plates inspected to assure perfect parallelism. In short, all the underlying design principles of our famous "finger-tip action" die sets—designs which have won unqualified approval from diemakers—are now available to users of large, special die sets.

Whatever your die set problem—large or small, standard or special—a Dieco engineer will be glad to help you. Call him into your pressroom, let him demonstrate to you why and how Dieco die sets will mount easier, last longer under even the toughest of conditions.

Call your local DIECO office Today!

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DETROIT, MICH.	20201 Sherwood Avenue, FOrrest 6-2480
PITTSBURGH, PA.	122 S. Sheridan Ave., EMerson 1-0040
DAYTON, O.	Die Supply Sales Co., 311 Vermont Ave., MI 9691
BUFFALO, N. Y.	440 Terrace Blvd., Depew, N. Y. REgent 6767-3
ST. LOUIS, MO.	Scott Special Tools, Inc., 1252 N. Kingshighway, FOrest 3454
BIRMINGHAM, ALA.	Production Tooling Service, 422 N. 24th St., 4-9081
CHARLOTTE, N. C.	Apex Machine Tool Supply, Inc., 3107 Wilkinson Blvd., FR 6-6521
NASHVILLE, TENN.	Ralph Landrum Tool and Die Supplies, 1107 Granada Ave., 28-7208

All die sets the same? Not at all—write today for Catalog 70 and learn how Dieco differs.

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SINCE 1857

THE DIE SUPPLY CO.
1400 Brookpark Road, Cleveland, Ohio
a subsidiary of E. W. BLISS COMPANY

DIECO

Industry's most complete line of die sets and die makers supplies

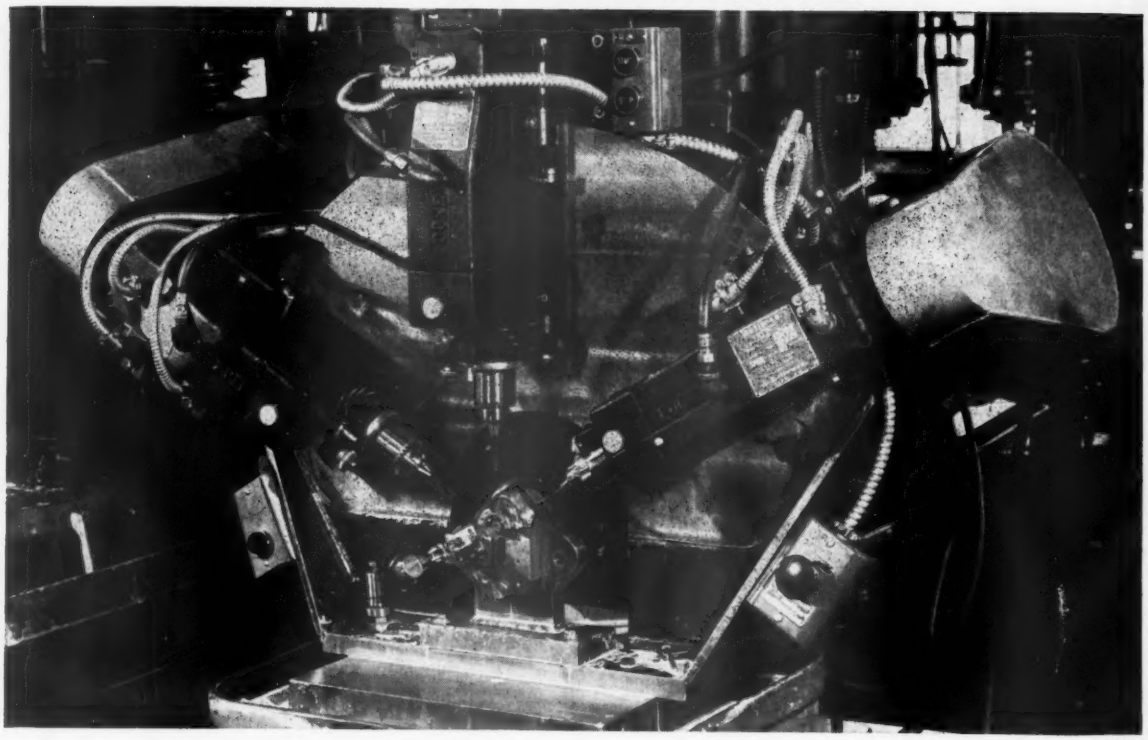
DIE SETS · GUIDE PINS · BUSHINGS · SPRINGS · SOCKET HEAD SCREWS · 5001 ITEMS

CIRCLE INFORM-A-GRAM KEY NO. 55

The Case of The Bellows Co.
VERSUS
The High Cost of Drilling Holes

Testimony taken by tape recording in the plant of [redacted], Detroit, Michigan

Operation: Drilling ¼" holes in hex head aircraft bolts on a tool-room-built machine, using three Bellows-Locke Drill Units



1102A

Statement of [redacted], General Superintendent

Q. How was this operation performed before you built this special machine?

A. We drilled on a single spindle by hand, with an index fixture to locate the three stations. However, it was difficult to hold a true position and the hole did not come through parallel from one end to another.

Q. Why wouldn't it come through parallel?

A. On account of feed and speed. The feed had to be controlled by hand.

Q. The old way, besides hand feeding, you would have to hand index the part?

A. Right. We had to index every time we drilled a hole.

Q. Can you give me a comparison of production rates on the old method and on this machine?

A. We increased almost 50%.

Q. What is the highest rate of production you get on this machine?

A. Somewhere around 240 pieces per hour.

Q. What other advantages have you found? You get a good deal less spoilage on finished parts, don't you?

A. Yes, considerably. We hardly get any spoilage at all now.

Q. On the old method, did you need to use a skilled operator?

A. Well, he had to know something about it in order to handle the drill carefully. When we're using a No. 60 drill, it does require a person that knows how to handle it.

Q. On this machine, you just use a girl operator, don't you?

A. That's all—the machine takes anybody as long as they can put a part in and press the button and take the part out.

Q. How long has this machine been in operation in your shop?

A. I can't tell exactly—about six months or more.

Q. Has it been working every day?

A. 9 hours a day, 5 days, sometimes 6 days, a week.

Q. Do you have other Bellows equipment in your plant here?

A. We have two infeeds on centerless grinders; we have all our milling machines operated by Bellows Air Motors; vises operated by Air motors; also on Dearborn fixtures which we index; as well as Air Motors on collets—it's all Bellows operated.

Q. Do you find this equipment adaptable for use on other machine tools?

A. Yes, we find it can be used on any machine.

Q. How long have you been using Bellows equipment here?

A. Ever since I remember—around 1945 or '46, during the last war.

Q. Do you have any of those old Bellows Air Motors around here now?

A. Yes, we have quite a few—a number of them were destroyed in 1948 when we had a fire, but after the fire we were able to overhaul them and put them back on the machines.

Q. You mean you put them in operation after they were damaged in the fire?

A. That's right.

Q. Are they still working?

A. Some of them are still working.

Q. They must be about 10 years old now?

A. Yes, they must be.

Statement of [redacted], Machine Operator

Q. [redacted], how long have you worked here?

A. Eight months.

Q. Did you do this operation on the old machine where you had to do it by hand?

A. Yes, sir.

Q. Could you tell me a little bit about that?

A. Well, it was not as easy to work as this new machine.

Q. Why was it hard to work on the old machine?

A. Well, you had to turn it every time you drilled and on the automatic, it turns by itself.

Q. And each time you turned it, did you have to pull the drill down?

A. Yes, we had to pull the drill down each time we drilled a hole.

Q. Did your shoulders get tired?

A. Oh, yes. It made your arms and shoulders awfully tired.

Q. Did you have to take any rest periods on the old machine?

A. Yes, because my arms would get so tired I couldn't keep on working.

Q. How often would you have to rest?

A. About twice during the morning.

Q. When you'd go out to lunch after working on this old machine—did your arms get stiff or anything like that?

A. Yes, at night—especially when I'd quit work, they'd get awful stiff.

Q. What did you do for it?

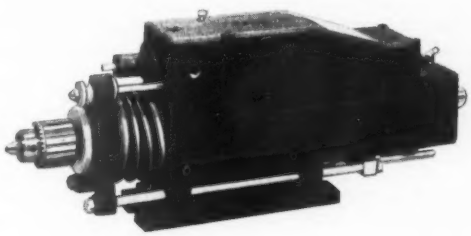
A. Rub them and bathe them and that's about all, I guess. Then do it again the next day.

Q. I imagine you like this new operation pretty well?

A. Oh, yes, I like this fine.

The electrically driven spindle is fed by air power up to the work at which point hydraulic feed control takes over. Built-in speed controls permit regulation of rapid traverse. Drill depth adjustable up to 3". Drilling capacity up to 3/8" in mild steel. All controls are built-in. Valving is electrically actuated. Depth accuracy .005" (with optional electric depth control .001"). Optional deep hole drilling controls. Available in three types: pulley driven, in-line direct motor drive, or parallel mount motor drive. Also available with reversing motor for direct tapping operations.

This Is the Drill Unit That Increased Hole Drilling Production Almost 50%



WRITE FOR THIS BOOKLET

Describes the Bellows-Locke Drill Unit in detail—shows how and where it can be used to best advantage. Free on request. Address: The Bellows Co., Dept. TP 255 Akron 9, Ohio.

1102A

The Bellows Co.
AKRON, OHIO

MAIL COUPON FOR BULLETIN

☐ Please send me free Bulletin on Bellows-Locke Drilling and Tapping Units:

Name:_____

Company:_____

Address:_____ *TP 255*

CIRCLE INFORM-A-GRAM KEY NO. 56

prolong tool life • cut finishing costs with LIQUAMATTE® wet blasting

Burrs, fuzz and feather edges spell trouble for tools. Liquamatte wet blasting removes these impediments quickly and thoroughly. Loading and build-up are eliminated. Tool edges are sharp and well-defined, and cutting tools stay sharper longer.

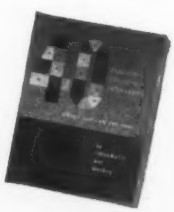
Liquamatte finishing also provides a better surface for plating. With all feather edges removed, there are no burrs to break off and thus remove the plating from the cutting edge. Blasting after plating imparts a fine matte surface over which lubricant and materials flow easily, improving performance and life of the tools.

Liquamatte wet blasting is fast, too. One tool manufacturer now finishes 5 to 6 drills in the time formerly needed to wire brush only one. Less time — less cost.

Field-designed and tested, the simplified Liquamatte cuts time and costs in an almost unlimited number of applications. A new 16-page brochure, packed with pictures, drawings and fact-filled copy, tells of 40 cleaning and finishing operations in which Liquamatte wet blasting cuts costs. The machine, its components and principles of operation also explained in detail.

You will find much valuable information in this new brochure. Send for Brochure No. 451-D.

American WHEELABRATOR®



AMERICAN WHEELABRATOR & EQUIPMENT CORP., 852 S. Byrkit St., Mishawaka, Ind.

CIRCLE INFORM-A-GRAM KEY NO. 58

Will You Be There?

Feb. 8-10. The Society of the Plastics Industry, Inc. 10th Annual Reinforced Plastics Division Conference. Hotel Statler, Los Angeles.

•

Feb. 10-12. National Tool & Die Manufacturers Association. Annual Winter Meeting. Ambassador Hotel, Los Angeles.

•

Feb. 17-18. American Materials Handling Society. 5th Annual Materials Handling Conference. Purdue University, Lafayette, Ind.

•

Mar. 14-18. American Society of Tool Engineers. 1st Western Industrial Exposition. Shrine Auditorium and Exposition Hall, Los Angeles.

•

Mar. 16-18. Pressed Metal Institute. 6th Annual Spring Technical Meeting. Hotel Carter, Cleveland.

•

Mar. 28-29. American Institute of Electrical Engineers. Materials Handling Conference. Hotel Cleveland, Cleveland.

•

Mar. 28-Apr. 1. American Society for Metals. 9th Western Metal Exposition. Pan-Pacific Auditorium, Los Angeles.

•

Apr. 5-7. National Fluid Power Association. Annual Spring Meeting. Colorado Springs, Colo.

•

Apr. 6-10. World Plastics Fair and Trade Exposition, Inc. National Guard Armory, Los Angeles.

•

Apr. 13-15. American Society of Lubrication Engineers. 10th Annual Meeting and Lubrication Exhibit. Hotel Sherman, Chicago.

•

Apr. 18-21. American Management Association. 24th National Packaging Exposition. International Amphitheatre, Chicago.

From Pittsburgh comes latest news of...

An Important New Source of Cemented Carbides

Firth-Loach: America's most modern carbide plant

Because this plant is all new, it offers an operating advantage that no other can claim: only the latest and most modern laboratory and production equipment and methods are used here. No out-dated equipment, nothing rebuilt—each piece of equipment is of the most advanced design available.

From ball milling to sintering, from molding to shaping, the new plant makes possible mass production under laboratory-like controls. Result: pilot and production runs prove that these precision controls pay off in finer carbides. Low-porosity carbides with great resistance to edge wear, chipping, cratering. Carbides of more uniform grade. Carbides with high impact strength. In short, from this, America's most modern carbide plant, comes the truly modern carbide—FIRLOMET.

...manned by an outstanding team of metallurgists and carbide specialists

The men who have banded together to form Firth-Loach Metals Inc. represent a combined total of some 200 years' experience in this still young carbide field. They've held top positions in leading U. S. carbide firms. Several did the first U. S. carbide work... developed the first "tough" carbide grades... many special grades ... designed much of the standard carbide-producing equipment in use today. Believing, however, that the quality of carbides could be upgraded through use of new techniques, they formed Firth-Loach Metals Inc. to carry out their ideas. And the results to date have been impressive—precision control of Firlomet production consistently yields low-porosity carbides of uniformly higher grades.

...and guided by this policy: "Carbide makers—not fabricators"

When carbides were new, little was known about their fabrication; therefore, the carbide producers also had to do its fabrication. "*But* all that's changed now, and we who have formed Firth-Loach feel that it is now time for producers to leave carbide fabrication to the tool and die industry.

"And Firth-Loach will do just that. We are carbide makers—not fabricators. As such we are able to devote our full energies to the development and manufacture of finer carbides... to the rendering of better service and delivery."

New Catalog available

Describes the entire line, lists prices; write for your copy today.

FIRLOMET

Experience Experience

Precision Dependability Service

A complete line of cemented carbides for all applications

standard and special blanks • rectangular strips • pulley grooving blanks
unground inserts • heading die nibs • inserts • specials

FIRTH-LOACH METALS Inc.

Buttermilk Hollow Road, McKeesport, Pennsylvania

CIRCLE INFORM-A-GRAM KEY NO. 59

BARNES MEANS THE BEST IN BAND OR HACK SAW BLADES

ONLY IN BARNES

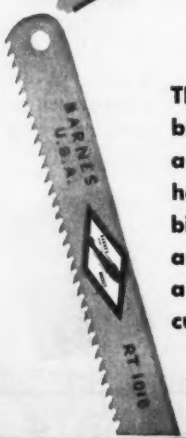
GRADIENT HARDNESS

•••ROCKET

POWER and HAND BLADES

HIGH SPEED STEEL

TOUGH! FLEXIBLE! SAFE!



The Rocket is the ideal *all-purpose* hack saw blade. The balance between cutting ability and safety is perfect. The teeth are uniformly hardened, the back is semi-hard. This combination gives you a blade that cuts, is flexible and safe. The Rocket will not shatter. Here is a blade that assures *extra* hours of *safer* cutting.

The Rocket is available in both POWER and HAND BLADES — both are Tough, Flexible and Safe.

W. O. BARNES CO., INC.
DETROIT 14, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 60

"Commendable Comments"

"A healthy year for the carbide industry is anticipated because of low inventories, defense use of carbide, and general business upturn."

—K. R. Beardslee, General Manager, Carboloy Dept. of General Electric Company.

"New metallurgical processes will provide ways of salvaging materials now discarded or lost . . . the United States discards more manganese than is required for the steel industry."

—Robert A. Lubker, Manager of the Metals Research Dept. Armour Research Foundation.

"Sound waves soon will be sent through materials to detect flaws so that defections may be anticipated before they occur."

—Dr. Howard C. Hardy and Robert W. Benson, "Sound" experts at Armour Research Foundation.

"Research efforts toward the development of new products in both consumer goods and capital goods industries are now at the most advanced rate in our history."

—Dr. Martin R. Gainsbrugh, Chief Economist and Director, National Industrial Conference Board, Inc. at the Stanford Research Institute's 9th Annual Associates Day.

"The electronics industry is characterized by a high degree of vision and a high degree of imagination. Industry is continually achieving things which a few years ago were considered impossible."

—From an address by David Packard, President, Hewlett-Packard Co. at the Stanford Research Institute's 9th Annual Associates Day.

"Since new factories now being built will be used for decades wherever located, we must do our best to think decades ahead in planning the location of our mobilization support facilities. When we deprive an enemy of profitable targets we actually deprive him of striking power."

—Victor A. Cooley, Associate Director, Office of Defense Mobilization, at the 9th Annual Associates Day of Stanford Research Institute.

"Success in today's business climate depends upon the whole-hearted, positive cooperation of all those participating in the production of quality products at competitive prices."

—Robert W. Conder, Vice President and Director of Industrial Relations of Chrysler.

BENCO COLLETS

FOR ACME MACHINES

will not break off at the threads or your money back

Due to our unique design and specialized manufacturing process we can guarantee that Benco Collets for Acme Machines will not break off at the threads . . . on a money back or free replacement basis.

Benco Collets are made from high carbon, alloy tool steel; not carburized steel. The threads have a tensile strength of more than 175,000 per square inch. Benco Collets have a guaranteed accuracy of .001 run-out per inch of bar extension from the face of the collet.

With all their extra features and your money-back guarantee, Benco Collets for Acme Machines cost no more than ordinary collets. You can save trouble, time and money by using Benco Collets . . . they assure you maximum satisfaction regardless of the size and type of material you use. You can't lose when you buy Benco Collets for your Acme Machines . . . they won't break off at the threads or you get your money back or a free collet. Specify Benco every time—for quality—for value—for performance.

Above is a 1" collet removed from a 1" machine. Imagine the cost of the wreck this collet caused! These two pieces had to be removed from the machine and a new collet installed with loss of time and production.

The Benco Collet shown at the left, due to special engineering, will not break off at the threads.

the **BENCO** *line includes:*

- Master Pushers and Pads
- Master Collets and Pads
- Pushers and Feed Fingers
- Solid Collets
- Ejector Collets
- Carbide-faced Stock Stops for B. & S. Machines
- Collet Sleeves and Chuck Nuts for B. & S. Machines

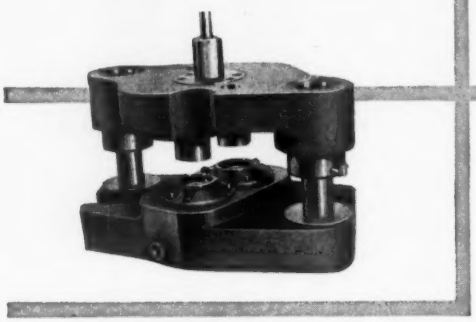
Benco COLLET MANUFACTURING CO.

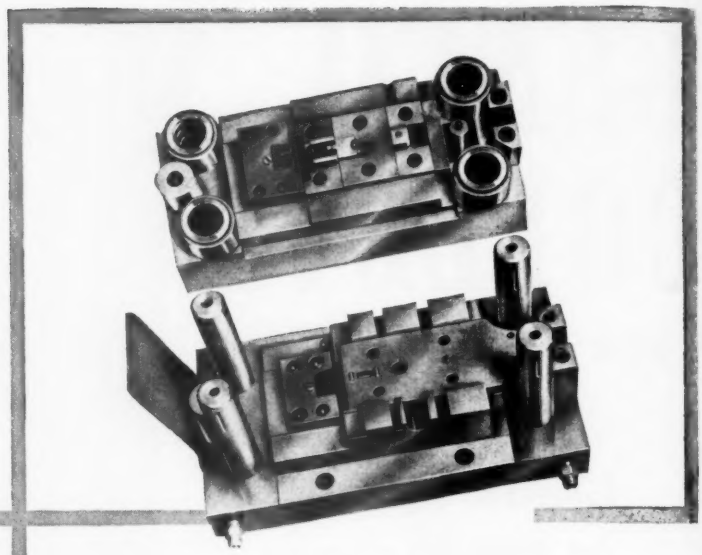
CLEVELAND 14, OHIO

REPRESENTATIVES: Tornquist Machinery Company, Los Angeles, Calif.; Dorow Machine Tools, Wichita, Kan.; Harry Dunn Corp., Houston, Texas; J. K. Bousum Co., Detroit, Mich.; Walter J. Greenleaf Co., Pittsburgh and Erie, Pa.; Hospelhorn Tool & Supply Co., Dayton, Ohio; Kel-Sir Company, Milwaukee, Wisc.; Mason & Luttrell Sales Eng., Okemos, Mich.; Fred J. McMillen, Providence, R. I.; Pearse-Dengel Tool Company, Hasbrouck Heights, N. J.; Philadelphia Tool Company, Bala-Cynwyd, Pa.; Erwin A. Slate, Gasport, N.Y.; W. C. Straub, Cleveland, Ohio; G. W. Wittlinger, Chicago, Ill.; J. E. Dilworth Company, Memphis, Tenn.; H. M. Scherling, Minneapolis, Minn.; Die Makers Supply Co., Kansas City, Mo.; H. F. Soderling Co., Seattle, Wash.; Production Tools, Toronto, Canada.

CIRCLE INFORM-A-GRAM KEY NO. 61

The die shown below is used at the Armstrong Cork Company for blanking and drawing screw bottle caps. Equipped with Carboloy cemented carbide, it operates accurately for months on material .006" thick. Steel dies had to be changed once a week.





Production increased 7,000 pieces per hour, tool maintenance cost dropped two thirds, when Carboloy cemented carbide parts were installed on all four stations of this progressive die set (above). It is used in producing SPEED NUTS® at Tinnerman Products, Inc. Stock is SAE 1060, 13/16" wide and .028" thick. Feed and blank length, .632", operating at 750 strokes per minute.

Replacing steel dies with Carboloy® cemented carbide dies, Tinnerman Products, Inc., obtained...

7,000 extra pieces per hour

THE DIES you use may be complex, like this Tinnerman die. Or simple, like the Armstrong Cork Company die.

In either case, you can speed production, and save time and money, by equipping them with Carboloy cemented carbide.

These two case histories merely indicate the wide range of carbide press-die applications, and their benefits – increased production, decreased maintenance downtime, lower die-maintenance costs, better product-quality control. It all adds up to better products, lower costs, greater customer satisfaction.

A Carboloy Sales Engineer will be glad to show you or your diemaker scores of case histories proving these benefits. He'll show you, too, how simple it is to apply and maintain carbide dies. Write, or send coupon.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

MAIL COUPON TODAY

Carboloy Department of General Electric Company
11111 E. 8 Mile Ave., Detroit 32, Michigan

- ☐ Send me Carboloy Die Engineering Manual D-124
- ☐ Send complete details on Carboloy Training School
- ☐ Have a Carboloy Field Engineer call at my plant

Name_____ Title_____

Company_____

Address_____

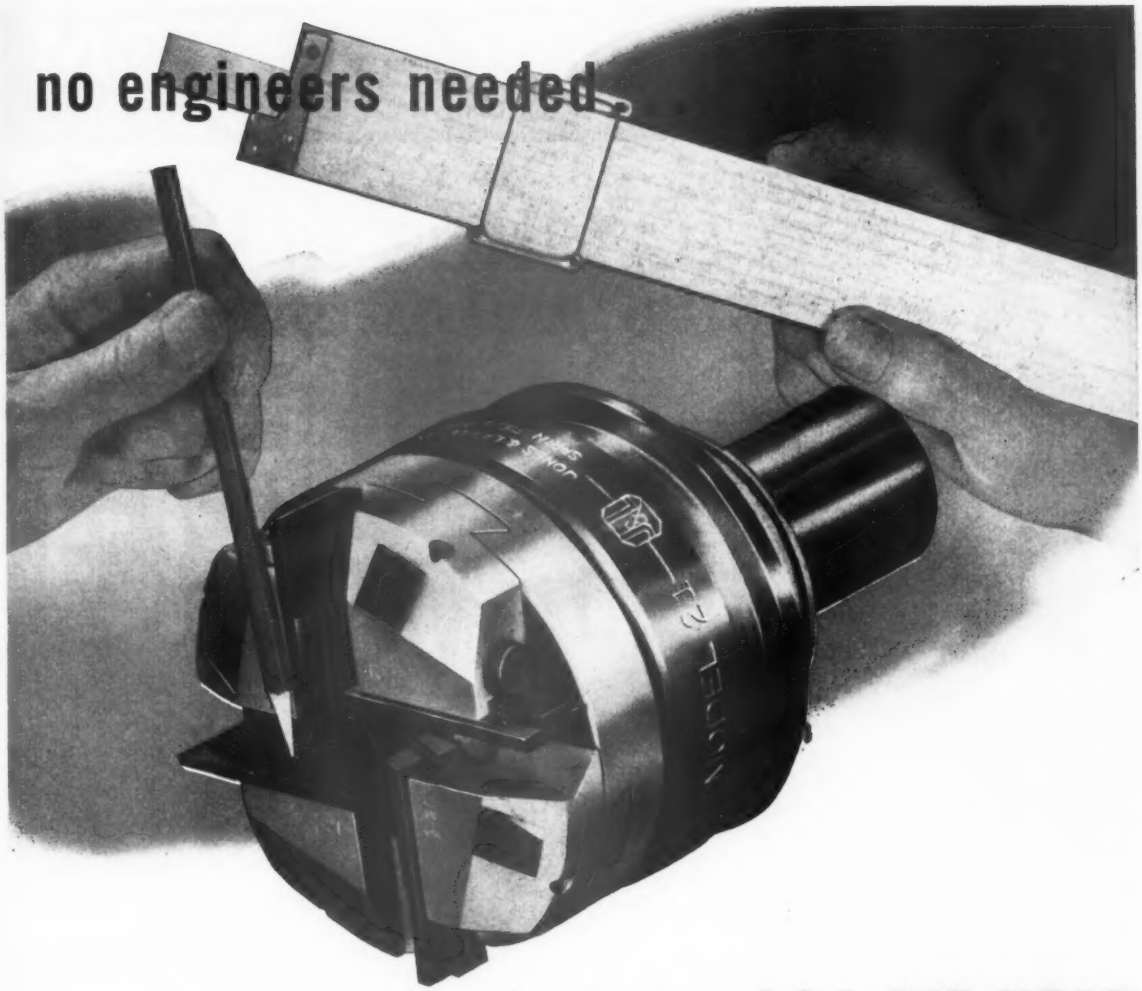
City_____ Zone_____ State_____

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

MANUFACTURERS OF CEMENTED CARBIDES, PERMANENT MAGNETS, THERMISTORS, HEVIMET, AND VACUUM-MELTED METALS.

Carboloy Created-Metals for Industrial Progress

CIRCLE INFORM-A-GRAM KEY NO. 62



...to use a J & L DIE HEAD

Here's why...

Chasers are changed and set in a matter of seconds without disturbing the holders or die head...

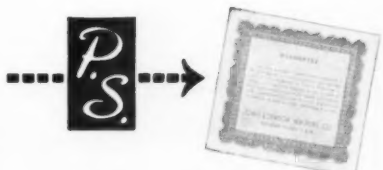
Only one set of holders is required to handle coarse, fine, or multiple threads over a wide range of sizes...

Controlled ratchet teeth provide definite points for location, locking and thrust support—making it easy to locate all four chasers in the same relative cutting position.

Best of all—the RESULTS ARE GUARANTEED... not sometimes, but *every* time. (And you get that in *writing*... Class III or better).

Disregard Class III if you like, but remember... J&L's system of *"no approximations"* adds up to even *more* savings for Class I and II.

You're paying for results... be sure you get them!



Why pay for 20 sets of ordinary chasers when you can get 20 controlled resharpenings with one set of J&L Chasers—PLUS—Guaranteed performance.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

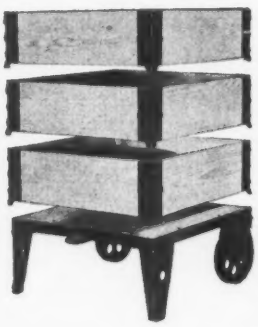
JONES & LAMSON MACHINE CO., 519 Clinton St., Dept. 710, Springfield, Vt., U.S.A. J&L THREAD TOOL DIV.

CIRCLE INFORM-A-GRAM KEY NO. 63

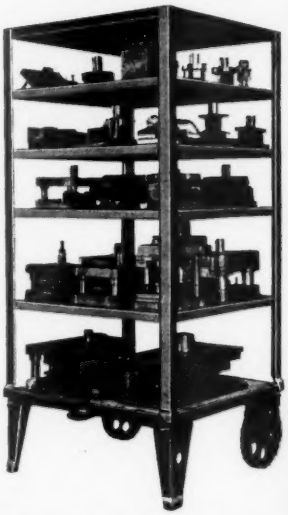
THE TURNER SYSTEM OF MATERIALS HANDLING

expertly designed— with BIG SAVINGS in mind!

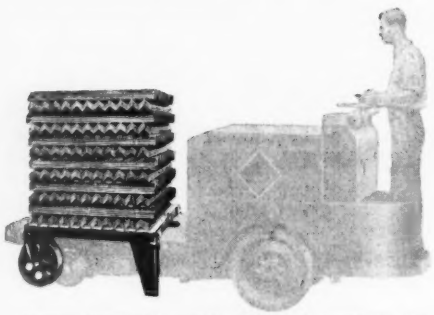
"DELIVER THE BIN AND SAVE THE HANDLING." Wooden-side or All-steel Bin Sections, Trays, Racks, or Die Tables fit on the Transport which is moved by hand Jimmy, power lift truck, crane or tractor.



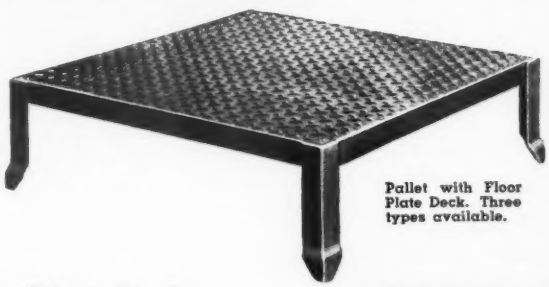
Bin Sections fit on Transports, Pallets or Skids. Bins as high or low as the particular job requires. Bin Sections are added as the load increases, removed as the load diminishes — ALWAYS the RIGHT SIZE bins. Four types available. Section Trays also available.



Turner Die Racks protect expensive dies, make them instantly accessible.



Turner Equipment works with and increases the efficiency of other modern materials handling units. Note how loaded Transport is moved on lift truck.



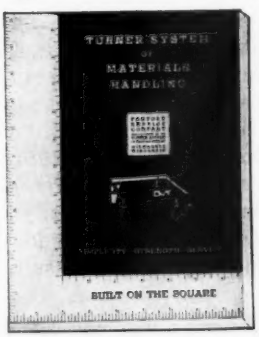
Pallet with Floor Plate Deck. Three types available.

Skids are same height as Turner Transport, may be used with all standard Turner units.

- Streamlined Storage
- To-the-ceiling Stacking
- Instant Mobility

cut Space, Labor and Equipment Costs up to 50%

FREE BOOK tells the complete story Write for your copy today.



FACTORY SERVICE COMPANY

4635 NORTH TWENTY-FIRST STREET MILWAUKEE 9, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 64

Let the MACKLIN M.M.-modern miracle-carbide cutting wheel rocket your production!

Carbide users are reaching new heights in grinding efficiency and production through the use of the new Macklin Modern Miracle carbide cutting wheel.

Increased wheel life up to 300% is not unusual from this radically new development in grinding. Faster stock removal, better finishes and decreased grinding costs are being achieved by many major users.

Call your Macklin distributor, or a Macklin field engineer, and let them prove how, you too, can get these cost and labor saving results. Write for information to Dept. 43.

Macklin Company

Manufacturers of GRINDING WHEELS AND OTHER ABRASIVE PRODUCTS

JACKSON, MICHIGAN

Sales offices are maintained in the larger cities, with ample stock carried. Distributors are located in all principal cities to contact and service the needs of customers.

CIRCLE INFORM-A-GRAM KEY NO. 65

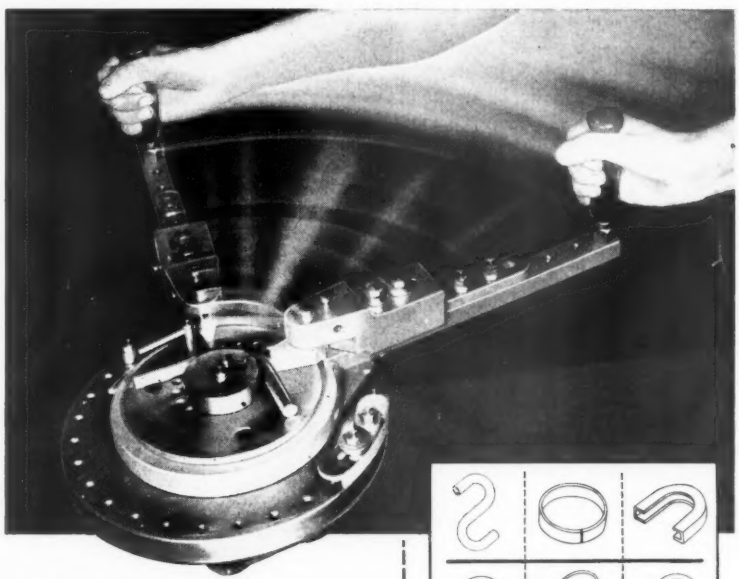
Editorial Index

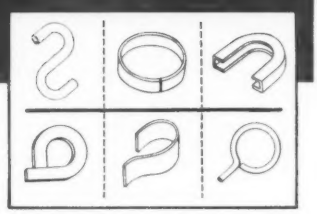
DEPARTMENTS

SHOP AIDS 134
Need help in any aspect of modern metalworking? See this section for materials and design aids, inspection and production techniques.

PUBLICATION PREVIEWS 138
Capsule description of current literature. Bulletins, brochures, catalogs and circulars — You name it.

PROGRESS ON PARADE 170
Check this carefully. It can bring new efficiency to your operation. This newest in machines, tools, and accessories.





Bend a Variety of Materials

Accurately, Easily, Quickly with a versatile DI-ACRO* BENDER

Simple and complex bends can be formed and duplicated in many ductile materials with a versatile Di-Acro Bender. Bending capacity of the five hand operated models ranges from 1/16" wire to 1" round mild steel bar. Many accessories are available for bending various materials and shapes. The Di-Acro Bender can be delivered completely tooled for most forming requirements in solid materials and tubing.

WANT MORE INFORMATION?
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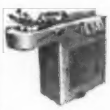

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TREPANNING. "Trepanning with Carbides on Existing Machine Tools" by F. W. Lucht, Carboloy Dept. of General Electric Co. 71

Trepanning provides a means for machining holes from the solid in steel, 10 to 20 times faster than with the conventional methods ordinarily used. Mr. Lucht describes the application of carbides to this process.

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More Production, More Profit
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Internal broaching of a cam ring. Note the complexity of the ring design. The steel is soft and tends to tear, yet this Continental Broach sizes the I.D. and cuts 8 splines 5.16" deep in one pass.

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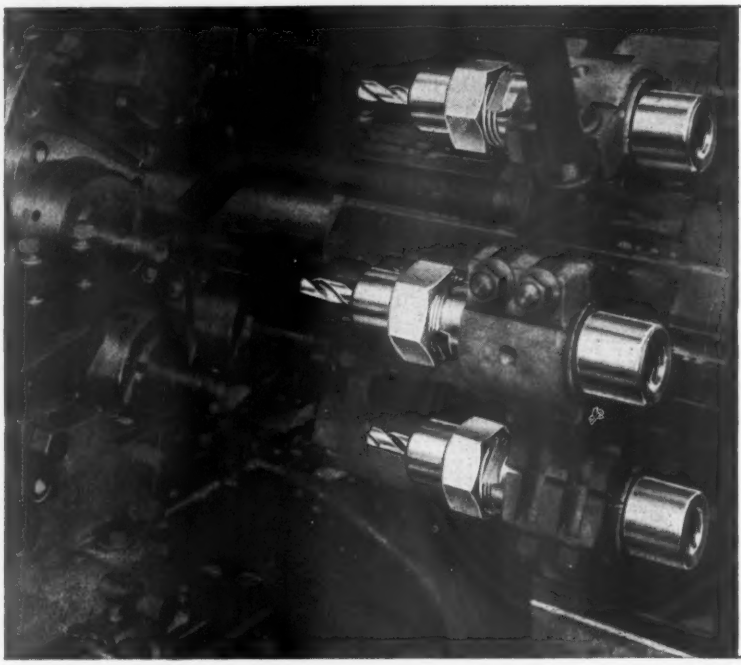

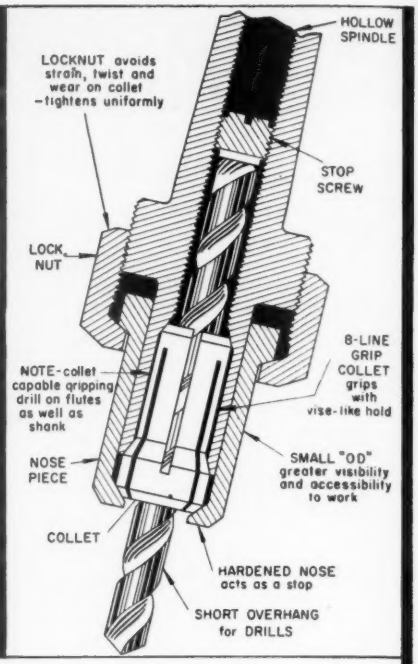
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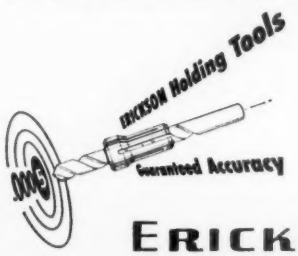

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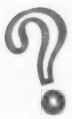


editorial

speaking of guarantees . . .

which is greater ·

the right of the employee

to a guaranteed annual wage?

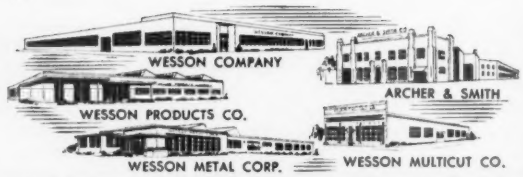
or

the right of the employer

to a guaranteed annual profit?

E. Willard Pennington

editor.



carbide NEWS

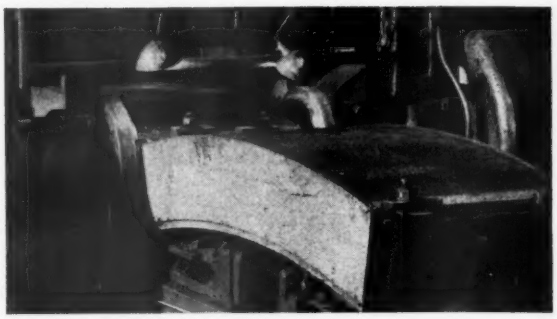
Output Jumps On Tough Job

Wessonmetal standard grades outperform all other tool materials tried on huge steel and cast iron tunnel segments

Typical of new performance records being reported for Wessonmetal carbides is the milling of 7-foot steel and cast iron segments for the new Lincoln tunnel addition using homemade 20-inch catheads.

High speed steel tools could not finish a single segment before burning up due to heavy sand inclusions. Other carbides also broke up or wore excessively. Part of the trouble resulted from the use of 28-year-old duplex millers for the machining operation.

When Wessonmetal grades "M" and "GS" were put on the job, the trouble was licked and 100 to 180 segments were produced per grind. Both Grade M, used on the steel segments, and Grade GS, used on the cast iron segments, have inherently high wear resistance and are designed for heavy shock applications.



Giant tunnel segments being milled with Wessonmetal carbides. Two segments are milled per setup. Large sand inclusions are evident on side of rough casting.

Two segments are milled per setup, averaging 35 minutes. Machines are operated at a maximum speed of 110 sfm with a feed of 6 ipm on the steel segments and 14 ipm on cast iron.

Average depth of cut ranges from 3/8" to 1/2", although it has often exceeded 7/8". The catheads are equipped with 15 style BR Wesson lathe tools held in place by two set screws.

Throw-Away Broach Teeth Give Four Carbide Edges, Eliminate Grinding

Elimination of all grinding and fast one-hand indexing to present any of four cutting edges are major advantages of the new-style carbide insert broach tool announced by Wesson Company.

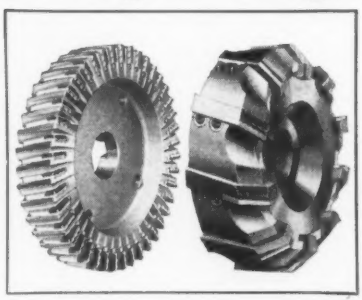
Seat for the carbide insert has a negative angle for maximum edge strength. The locking screw is flush with the top of the clamp, avoiding interference when loosening the lock holding the tool in broach bar.

New Rigidcuts Increase Economy, Milling Range

Two new Rigidcut inserted blade milling cutters, permitting higher feed rates and increased cutting depths are among recent Wesson Company developments.

Feeds of more than 100" per minute on cast iron finishing operations are now possible with the 7200 Series Rigidcut cutter. The new design, using over 4 blades per inch of diameter, eliminates one of the greatest obstacles to practical usage of high feeds on fine finishing operations.

Where a depth of cut up to 7/8" is needed on cast iron or steel, the new 3100 Series Rigidcut provides the necessary rigidity and strength because of its extra thick body. Special 1 1/2" high Wessonmetal carbide tipped blades are locked in with Wesson Dual-Wedg locks. Rapid and accurate setup is assured by specially designed blade serrations.



Two newest cutters in Rigidcut line. Left to right: Cutter designed for high feed finishing; cutter for heavy duty cast iron and steel machining.

CARBIDE DATA

Additional information and specifications available:

- ☐ Specification data on new throw-away insert type broach tool design.
- ☐ Wesson Progress Report on boring.

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TOOLING & PRODUCTION
The Magazine of Manufacturing Management

1934 - 1954 20th ANNIVERSARY YEAR

6th ANNUAL CARBIDES FEATURE ISSUE

TREPANNING WITH CARBIDES ON EXISTING MACHINE TOOLS

by F. W. Lucht
Design and Application Engineer
CARBOLOY DEPARTMENT
General Electric Company
Detroit, Michigan

THE USE OF TREPANNING as another method for producing holes has made rapid strides in this country since early 1950. It has provided a means for machining holes from the solid in steel, ten to twenty times faster than with the conventional methods ordinarily used. Trepanning has not only offered a means for producing holes faster, but the resulting holes have been more accurate in size, have improved concentricity, have better alignment and have a higher degree of finish than with those produced by previous methods. All this adds up to reduced manufacturing costs and improved quality.

Trepanning was originally associated with producing holes 1¾" diameter and larger in various size gun barrels. But since the close of World War II, the use of this idea rapidly expanded to include the production of holes in various industrial products. The holes do not necessarily have to be deep holes as in gun barrels. The trepanning of short holes can also be equally as economical if a rapid means of loading and unloading the workpiece is provided.

There is economy in trepanning because in many cases the final hole can be produced accurately to size and alignment in one operation and in others it is only necessary to leave a sufficient amount of stock for a final light finish boring operation. This eliminates the added time required to enlarge holes by several drilling and boring operations, with the net result the final hole is never as accurate as it would have been if the initial hole had been properly trepanned from the solid.

An added advantage in producing holes by trepanning is the salvage value of the remain-

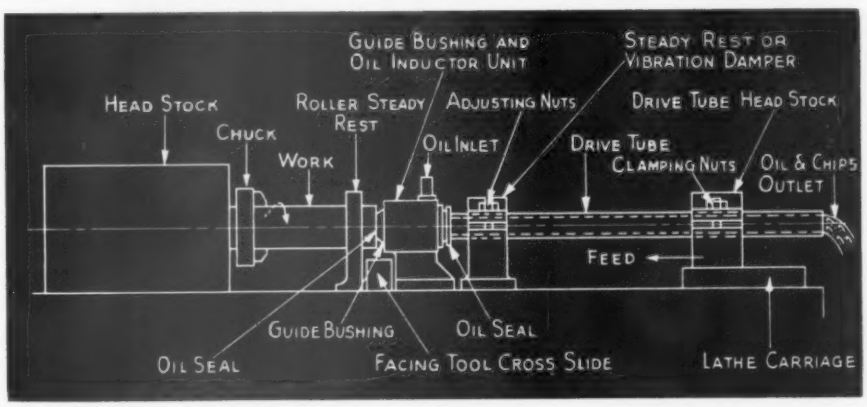


Fig. 1. Work rotating with head feeding end-wise only, for holes under 4½" dia. Oil enters around periphery of head and leaves with chips through the center of the head.

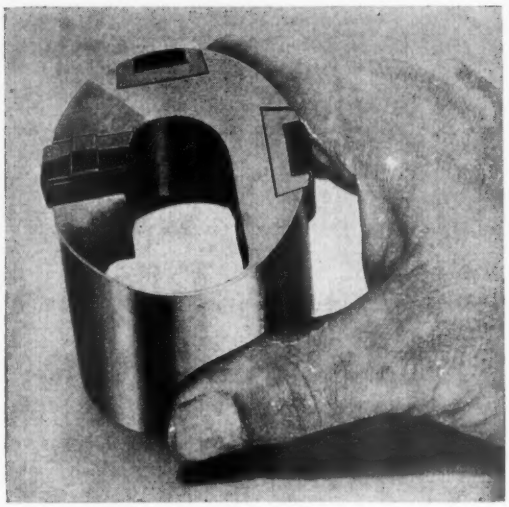


Fig. 2. Accurate, concentric holes 30 to 40 feet or more in length and up to 4½" dia. are produced by trepanning heads like this 2 15/16" unit used for "drilling" deep holes on lathes or boring machines. The use of carbide tips on replaceable blades and wear pads, and the lesser chip-removal effort required, make trepanning 10 to 20 times faster than conventional methods.

ing core; this value increasing with the core size as the hole size is increased.

Here is one way to apply trepanning to an advantage and save machining costs

Many short parts (nuts, spacers, etc.) with comparatively large holes are being made from bar stock on turret lathes. The holes are being drilled with large diameter high speed steel drills. The turning and facing operations on the part are being performed at the same time with difficulty with carbide tools because the cutting speeds, which are controlled by the high speed steel drill, are too low, causing premature carbide tool failure.

This work can be speeded up by the use of the trepanning idea. The hole can be produced first by trepanning the bar stock in 4 to 6 foot lengths on another machine. The turning, forming, facing, finish boring and cutoff operations can then be performed on the turret lathe. In this manner the operations on each machine can be handled at the most economical carbide cutting speed and feed, giving maximum tool life while holding the over-all machining time to a minimum.

When the trepanning idea was first introduced in this country it was disappointing to find that no deep hole boring machine or lathes capable of handling this type of machining operation were available. It was quickly found that the 25 hp a-c main drive motors had to be increased to a minimum of 50 hp d-c motors. In some cases the motor size had to be increased to 75 or even 100 hp when the material being trepanned could be machined in the higher speed range.

Usually the available cutting speed was too low to facilitate breaking the chips properly, necessitating increasing the spindle speed where possible to 500, 750 and even 1000 rpm to obtain cutting speeds in the range of 300-600 sfpm. This usually meant the size of the d-c motor had to be increased to 75 or even 100 hp to avoid spindle slow-up under operating conditions.

The increased speed combined with increased power made it necessary to change the plain spindle bearings to taper roller bearings, to remove all change gears from the head stock and then drive the main spindle direct from a variable speed d-c motor through the use of v-belts. A variable speed motor is necessary for this operation. For example, if 325 sfpm cutting speed (423 rpm), an 0.008" feed per revolution and a 0.060" wide by 0.020" deep chip

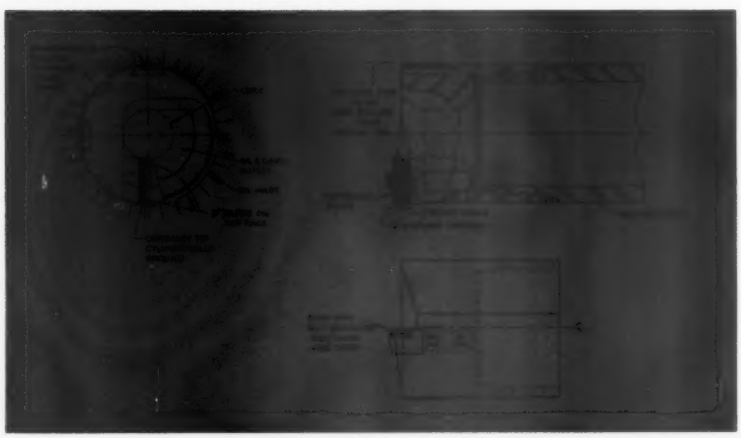


Fig. 3. Dimensional sketch of head shown in Figure 2, indicating method of attaching it to drive tube. Modified square thread is used to hold head in place to minimize seizing under heavy load. Cylindrical surfaces, front and rear of thread, locate head accurately on end of drive tube, providing necessary alignment.

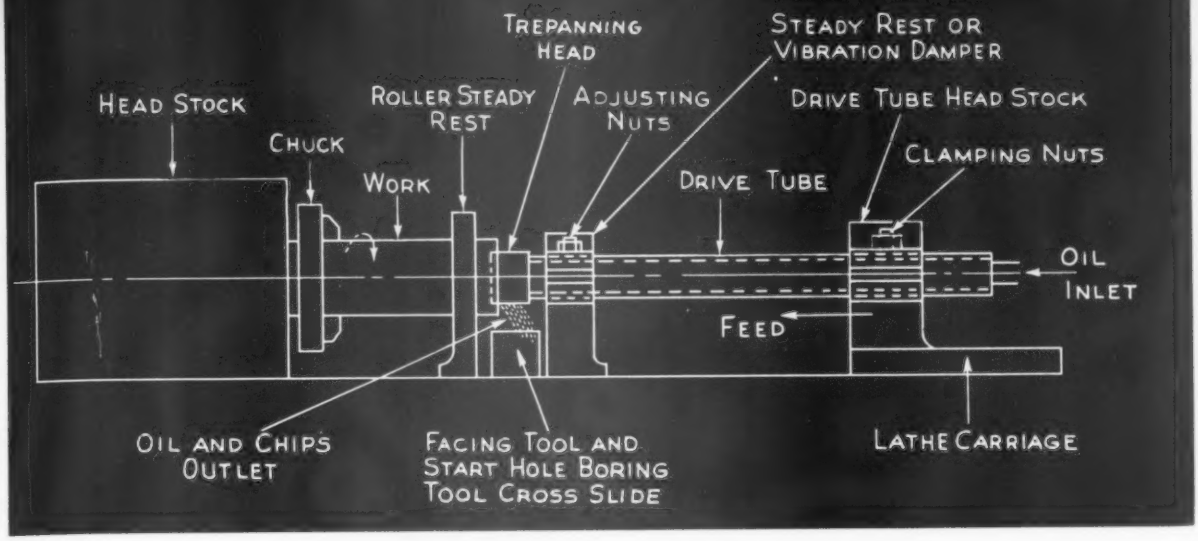


Fig. 4. Work rotating with head feeding end-wise only, for holes 4½" dia. and larger. Oil enters through center of head and leaves with chips along periphery of head.

breaker in the blade, give a good set of operating conditions for trepanning a 2 15/16" diameter hole in a steel forging having a 275-325 Brinell hardness, then a 4¾" diameter hole can also be trepanned satisfactorily in the same material by changing the spindle rpm to 260 which gives the same cutting speed in sfpm as previously used.

A variable speed motor is also helpful when the operator observes that the chips flowing from the cut are too large and inclined to pack and give intermittent chip flow. A slight adjustment to increase the cutting speed will again give the proper size chips and provide smooth operating conditions.

It is found advisable to use feeds per revolution ranging between 0.006" and 0.010" dependent on general operating conditions. In most cases the optimum feed per revolution is close to 0.008" for holes ranging in size from 2" to 20" diameter.

Experience indicates the best results can be obtained if feeds are always considered in terms of a basic feed per revolution instead of in terms of feed per minute.

Indications are that the use of a screw feed activated by a hydraulic motor provides the best operating conditions because the feed is infinitely variable and can be changed while the machine is in operation.

A 0.0002" change in chip thickness can make a noticeable difference in the size of the chip being produced. The indications are that the screw feed maintains a chip of more uniform thickness regardless of operating temperature, thus resulting in optimum tool life.

The major portion of the trepanning activity seems to fall within the 1¾" up to 8" diameter range where the ¾" wide trepanning blade has been used most frequently. This permits the standardization of this blade as well as the wear pads for all the head sizes within this range.

Power readings taken on several jobs indicate that one horse-power is required for rotating the work only, while 0.63 cubic inches of steel are being removed per minute.

Assuming a 4¾" diameter hole is to be trepanned through an alloy steel forging having a 275-325 Brinell hardness, using an 0.008" feed per revolution and a cutting speed of 325 sfpm, the following method of computation will give a close approximation of the power required to drive the spindle only of a deep hole boring machine.

325 ÷ (.2618 x 4.75)	=	260 rpm
0.008 x 260	=	2.08 in/min. feed
Area 4.75 diameter hole	=	17.720 sq. in.
Area 3.25 diameter core	=	8.296 sq. in.
Area annular opening	=	9.424 sq. in.
2.08 (in/min. feed) x 9.424	=	19.602 cu. in. removed/min.
19.602 (cu. in) ÷ 0.63	=	31.1 motor hp required

Under such conditions it is found safe to recommend the use of a 40 hp motor with no troublesome reduction in motor speed due to a dull blade.

During the past few years there has been an opportunity to observe the trepanning of a sufficient number of various types of stainless steels, heat and corrosion resistant materials, titanium alloys and other difficult to machine materials. In only a few cases, it was found, the cutting speed in sfpm had to be adjusted somewhat to better suit the material. But no real difficulty was experienced, indicating that

trepanning should always be considered for producing holes in the materials of the future.

Figure 1 shows the basic setup for trepanning holes 1¾" to 4½" diameter through a round workpiece on a deep hole boring machine, engine lathe or turret lathe. It is advisable to chuck one end in a three-jaw chuck and support the other end in a roller steady rest. The life of the needle bearings in these rolls is improved by increasing the roll diameter to about 6". If the workpiece is relatively long, another roller steady rest should be placed midway between its two ends.

The end of the workpiece next to the steady rest should be faced at right angles to the center line of the spindle, using a carbide (grade 370) single point tool mounted in the facing tool cross-slide as shown. This cross slide can be hand operated. This cut provides a flat surface for the oil seal on the end of the guide bushing and eliminates a possible runout which might effect hole alignment and open the oil seal.

The guide bushing on the guide bushing-oil inductor unit should be mounted on ball bearings because of the high speeds being used. The oil for flushing the chips away from the cut enters this unit under pressure behind the guide bushing as indicated and flows into an annular space around the drive tube. Then it flows to the cut between the guide bushing and the periphery of the trepanning head body, picks up the chips at the cut, flushes them through the opening in the end of the trepanning head between the blade and the core and out in the open between the core and the inside of the drive tube.

Another oil seal should be provided at the rear end of the guide bushing-oil inductor unit to prevent the oil under pressure leaking out around the drive tube and still providing a slidable fit.

The tail stock end of the drive tube should be mounted in a drive-tube headstock on the lathe carriage, and rigidly clamped in position with the aid of the bearing cap and clamping nuts.

It is always advisable to locate a steady-rest directly behind the guide bushing-oil inductor unit for damping the vibration resulting from the cutting action. The construction of this unit is the same as for the drive tube head stock only it is important that a two-piece bronze bushing be used between it and the drive tube to facilitate tightening the adjusting nuts to dampen the vibration and still obtain a slidable fit.

It is important that the spindle, chuck, steady rest, the guide bushing, the steady-rest or vibration damper and the drive tube headstock are in alignment. It is also important that the ways on the lathe bed are in alignment. The drive tube should be ground to a uniformly accurate size and be straight.

It is advisable that the holes through the guide bushing-oil inductor unit, the vibration damper unit and the drive tube headstock are made sufficiently large to handle the drive tube for the largest hole size to be trepanned on the machine, thus permitting the use of the proper bushings to accommodate smaller hole sizes.

It is of utmost importance to flush the chips away from the cut as rapidly as they are formed. This necessitates the use of a larger quantity of oil at higher pressures than commonly used around lathes. This may mean increasing the size of oil pump motors from 15 hp to 30 hp and increasing the capacity of the pump to 75-150 gallons per minute at a pressure of 300 psi while trepanning a deep hole. It also is found that a high quality type of soluble oil is best for trepanning, and should be applied in the ratio of 12 — 15 parts of water to one part oil.

A synthetic type of soluble oil containing both a wetting agent and a lubricating agent has also rated high for this class of work.

It is advisable to protect the oil pump by installing a permanent magnetic filter in its suction line to remove the fine steel particles which pass through the ordinary chip screens.

Figure 2 shows a 2 15/16" diameter trepanning head which is the type referred to in the discussion in connection with Figure 1.

This shows the carbide tipped (grade 350) three-step replaceable blade and the two identical carbide tipped (grade 370) taper-dovetail type replaceable type wear pads. Figure 3 shows a dimensional sketch of this head in more detail and the method of attaching it to the drive tube. A modified square thread is used to hold the head in place because there is a minimum possibility of this type of thread seizing under heavy load. The cylindrical surfaces at the front and the rear of the thread locates the head accurately on the end of the drive tube and gives it the necessary alignment.

It is advisable that the drive tube be made from alloy steel and have a 5/16" — 3/8" wall thickness.

When the holes to be trepanned are 4½" diameter and larger it is more economical to use a setup as shown in Figure 4 which elimi-

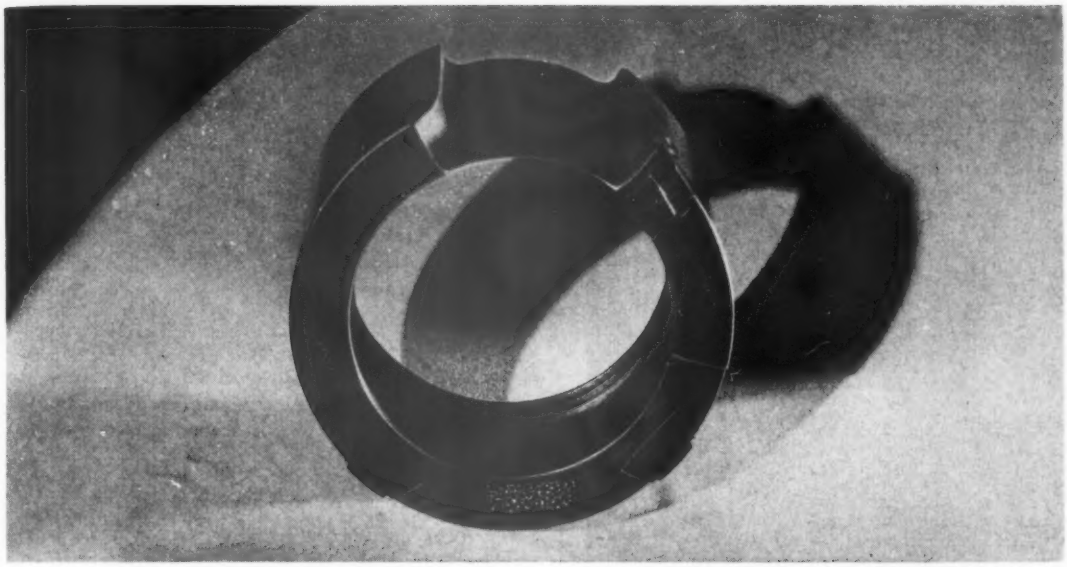


Fig. 5. Design is main difference between this trepanning head and that in Figure 2. Its three-step blade is tipped with grade 350 carbide, wear pads with grade 370. Its advantage: more economical setup thus eliminating use of guide bushing and oil inductor unit as in Figure 1.

nates the use of the guide bushing-oil inductor unit. The workpiece is set up the same as in Figure 1 and its end is faced at right angles to the center line of the spindle by using a carbide (grade 370) tipped single point tool mounted in the facing tool cross slide as shown. This cross slide can be hand-operated and can also be used to open up a starting hole 0.001″ — 0.002″ larger than the trepanning head diameter and 1/2″ — 9/16″ deep. Actually it is only necessary to machine this starting hole as an annular groove about 1/8″ wider than the trepanning blade width.

The design of the drive tube headstock, the steady rest or vibration damper, the drive tube and the method of attachment of the trepanning head to it is the same as referred to in Figure 1.

The main difference lies in the design of the trepanning head used which is shown in Figure 5. The cutting blade, the wear pads, their location and the method of holding them in the head are the same as for the trepanning head shown in Figure 2. In this case the oil enters under pressure through the rear end of the drive tube, flows between the drive tube and the core to the cut, picks up the chips and carries them through a longitudinal flute along the periphery of the trepanning head, into the annular space between the drive tube and the hole and flushes them out in the open as indicated in Figure 4.

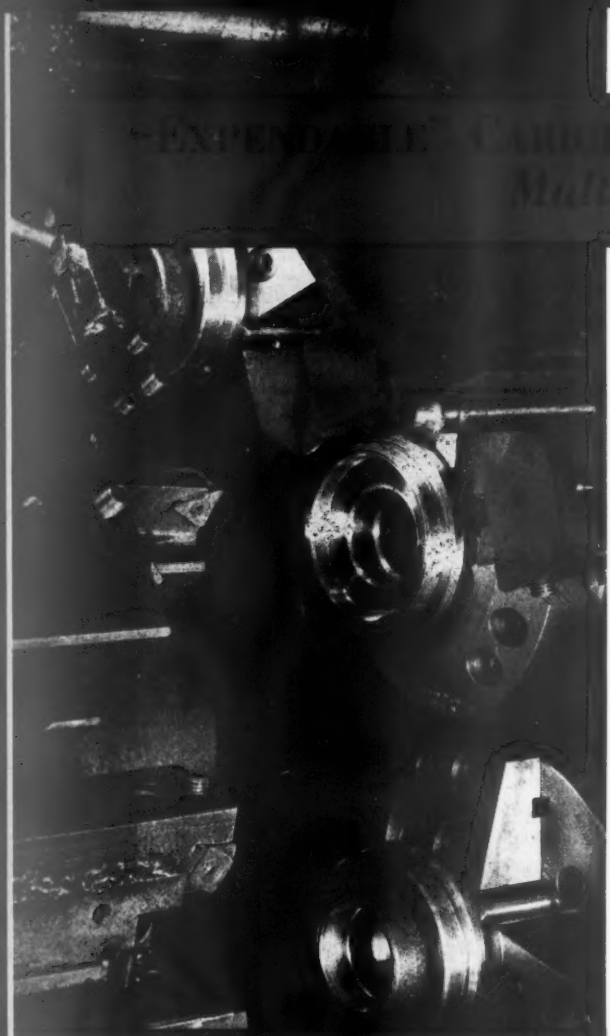
As mentioned previously, alignment is of major importance. It is advisable to start this operation by advancing the trepanning head into the starting hole by hand feed before starting the machine, the oil pump and finally the feed motor.

It has been interesting to watch how those who have done a certain amount of pioneering with trepanning have become enthusiastic over the results obtained after modifying one of their existing machine tools. They are now beginning to take full advantage of all the possibilities of trepanning and are applying them to some of their unusual applications.

The full impact of this experience and the savings resulting from this method have usually resulted in the purchase of a new, extremely rugged trepanning machine designed to include the various important features described. Such a machine, having maximum rigidity and capable of maintaining the alignment of its ways, and with the various units mounted on it, has unlimited potential in many manufacturing organizations today. Three large machine tool builders are in the process of building such machines.

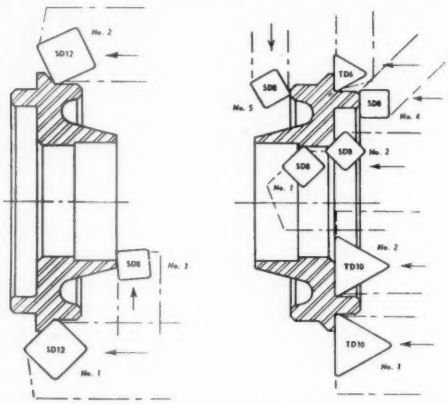
The discussion thus far has covered the trepanning in its simplest form where the work is symmetrical in shape and can be rotated at a comparatively high speed. The trepanning head does not rotate and is only fed end-wise. In a later issue the discussion will cover trepanning a hole through an irregular shaped part which cannot be rotated.

EXPENDABLE CARBIDE TOOLING Multiplies Automatic Output



PRODUCTION of SAE 1020 steel liner rings at the plant of a prominent equipment producer has been increased from 200 to 800 pcs/shift by utilizing tungsten carbide tooling. Both sides of the workpiece are machined by double indexing their 60-hp, eight-spindle New Britian Automatic and reversing the part in the chuck.

Operations handled are multiple turning of both the outside and inside diameters, in addition to facing and chamfering of the parts. Work is machined at a feed of 0.006 ipr, speed of 535 rpm, at



570 sfpm. Depth of cut varies between ⅛ to ⅝" on roughing and 0.030 to 0.050" on finishing. Heretofore these operations were performed with standard tipped carbide tooling which required excessive downtime for tool changes.

Typical example of the reduction in tool cost obtained on this job is shown in the accompanying comparative cost estimate, where tool cost for both rough and finish turning the part's O.D. was reduced 59% by using indexable carbide inserts. Tools performing other operations effected similar savings.

Now, with standard Kendex square and triangular inserts of grade K3H Kennametal, a new cutting point is obtained simply by loosening the socket-head screw and rotating the tip to a new cutting edge.

By interchanging inserts of the same size, even greater economies are effected. For example, holder No. 1 for an SD-12 insert has a 6° side rake. When its four cutting edges have been expended, the normal 12° side relief is decreased by grinding it to 6°, then the insert is used in holder No. 2 with no side rake for finish turning. Likewise, after all cutting edges on the TD-10 insert in holder No. 1 have been utilized, it is interchanged with a TD-10 insert in holder No. 2 and opposite corners used. Extended life is similarly obtained by switching their SD-8 inserts.

COMPARATIVE COST ESTIMATE

PREVIOUS CARBIDE TOOLING

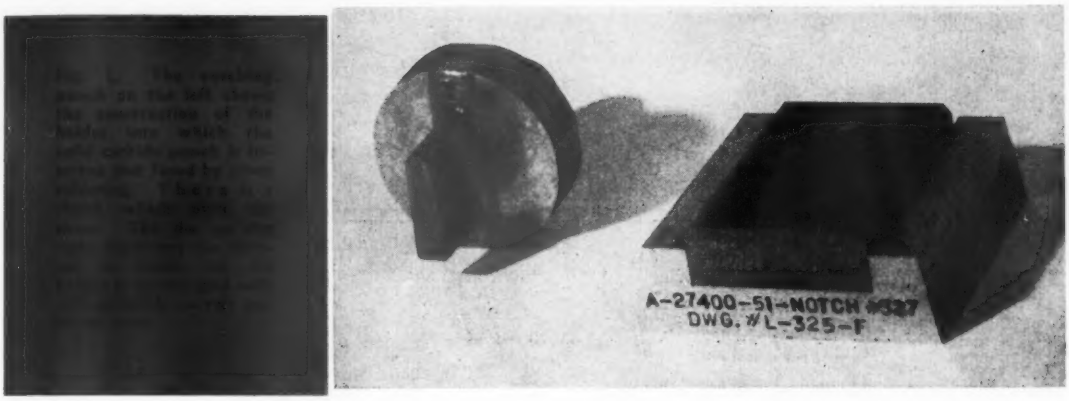
	Rough Turn O. D.	Finish Turn O. D.
Tool Cost	$85.00	$3.70
Regrind Cost	5 at $2.00 ea.	4 at $0.50 ea.
Total Tool Cost	$95.00	$5.70
Average Pieces per Tool	1900	1200
Tool Cost per Piece	$0.023	$0.005

Total Tool Cost Per Piece $0.027

KENDEX TOOLING

	Rough Turn O. D.	Finish Turn O. D.
Cost of Holder	$85.00	$14.50
Prorated Over 100 Inserts	0.85	0.14
Cost of Insert	4.84	2.00 (grind)
Total Tool Cost	5.22	2.14 (1 only)
Average Pieces per Tool	600	1800
Tool Cost per Piece	$ 0.009	$ 0.001

Total Tool Cost Per Piece $0.011



HIGH SPEED CARBIDE NOTCHING DIES

by John M. Bryan

Chief Industrial Engineer, THE ELECTRIC PRODUCTS COMPANY, Cleveland, Ohio

ACCURATELY NOTCHED laminations used in rotor, stator, and armature construction is a prerequisite at The Electric Products Company, builders of electric motors and generators ranging in size from 5 to 5000 hp. Most of this electrical equipment is built on special order with the exception of a line of standard packaged motor-generator battery chargers for charging industrial truck batteries.

Frequently a customer requires a motor mounting or a lead-in for the cables which are not found in standard motors. These particular jobs require special designing which sometimes extends to other electrical characteristics and thereby making necessary a wide variety of notched laminations.

Single notching of the laminations has been found to be the most economical from the standpoint of notching die cost and the quantity production possible on our high speed press equipment.

When carbide notching dies were adopted several years ago, an accurate method was set up to record data for a study on carbide die life. The record shows that one of the first carbide dies installed has been operating on a V & O, Model 410 notching press running at 450 strokes per min. The material has been 26 gage, transformer 72 steel, with 3¾% silicon.

According to the record, the number of hits made on this die is 5,443,200 with the punch and die having been ground five times. This is an average of 1,088,640 hits per die grind. The amount of stock removed at each grind was 0.003" from both punch and die.

As a comparison figure with high speed steel lamination dies, the average number of hits per die grind has been 18,000 with a 0.010" stock removal per die grind. This comparison shows that the carbide die will give 60 times more

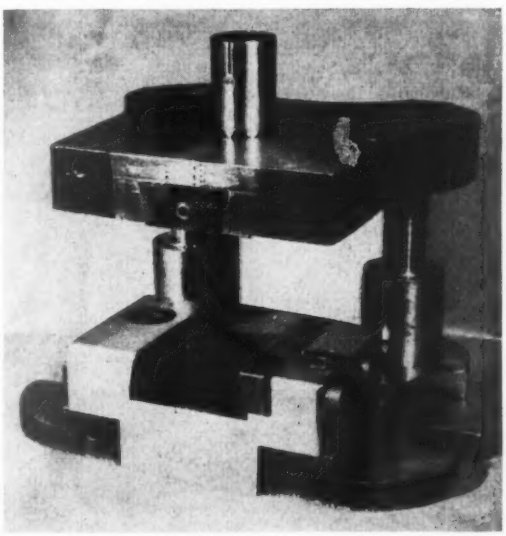


Fig. 2. A Lempco die set is shown with the die block fixture and punch slide installed. The dovetail construction of these fixtures with the movable wedge blocks simplifies the mounting and clamping of the punch and die in the die set.

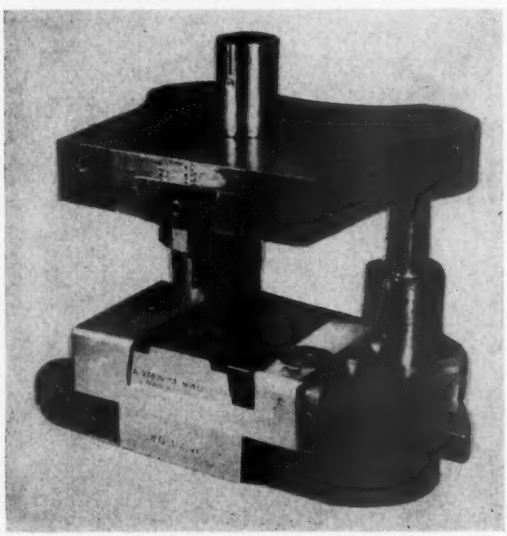
hits per die grind than the high speed steel.

The lamination production requirements in our plant are such that long press runs of any one type do not predominate, that is, the usual run is of more or less short duration.

This manufacturing pattern made it imperative that a method be devised to make press setups as simple as possible, so that dies could be changed quickly and press downtime held to a minimum.

To accomplish this a universal die shrink block was developed with standard outside dimensions and having two exterior sides of 10° dovetail construction, as shown in Figure 1. The die is a split die and when finished to specifications, the die block is shrunk around the die, doweled, and bolted.

Fig. 4. A Lempco die set with punch and die installed. When this die set is mounted in the notching press, it remains set up since it does not have to be removed when the die has to be changed. Loosening three cap screws respectively on the die holder and punch slide permits their removal.



To mount the die in the press, a die block holding fixture, Figures 2 and 3, was designed for installation in Lempco die sets. The fixture is machined with a 10° dovetail slot and is provided with a movable wedge block for clamping the die block in place. The inside dimensions of the dovetail slot are such that the die block can be easily slipped into place.

It should be noted that the die block, Figure 1, is of a size sufficient to permit machining a cavity large enough to accommodate any carbide or steel notching die. Since the 10° dovetail on the die block matches the 10° dovetail of the fixture, then any die can be slipped into any fixture.

The punch holder, Figure 1, is constructed of heavy plate to which a shank is attached. A milled slot provides a recess into which the solid carbide punch is inserted and fused in place with silver solder.

To provide for holding the punch in the die set, a 10° dovetail slot is machined in the upper plate. Into this slot fits a 10° dovetail slide and wedge block as shown in Figures 2 and 3. A hole is bored in the underside of the slide to receive the shank of the punch holder, Figure 3. The punch holder is held in the slide by the set screw shown.

In the initial setup, the die set, with the die holding fixture and punch slide installed, is mounted in the notching press. This is then a permanent setup since the die set does not have to be removed from the press for die changes.

In preparing for a notching run, it is only necessary to slide the punch and die, already installed in their respective holders, into the die set, Figure 4, tighten three cap screws on each wedge block thereby securely clamping the punch and die in place.

Our V & O Model 410 notcher is a high speed press of 5 tons rated capacity with a rotary indexing fixture designed for notching rotor and stator laminations.

The indexing fixture is of the vertical spindle type with a round projection on the upper spindle end to accommodate the shaft hole in the lamination. A square pin next to the projection fits the key-way notch in the lamination and provides the driving force for indexing the lamination.

Most of our dies are built by the Shaker Tool & Die Co., and Shamrock Tool & Die Co. They have on file all the specifications for the die blocks and punch holders. Thus in specifying a die, only the design of the punch and die proper has to be furnished.

FINE FINISHING CARBIDE SURFACES

by F. J. Lennon
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IN ESTABLISHING specifications on carbide tools and parts, one of the items to be considered is the type and degree of finish that may be required. In considering finishes, several factors have to be evaluated. In the grinding of a cutting tool, the size of the diamond particles that go to make up the diamond grinding wheel will determine the smoothness of the cutting edge itself, hence this becomes a specification for the quality of cutting edges.

We refer to a completely different set of conditions in discussing finishes on carbide surfaces. On such parts as wear strips, rolls, bushings, etc. surface finish is of extreme importance while on a cutting tool, the quality of the edge is more of a factor in determining tool efficiency than the smoothness of the other surfaces.

When referring to specifications on flat carbide surfaces, two considerations should be made. One is to determine how flat the piece must be and, second, what degree of polish is required. In some cases a flat surface is the only requirement, while in others a surface that is highly polished and free from scratches or other defects is necessary. In some cases a combination of both of these conditions is necessary for a specific application.

There is actually no standard in the carbide industry today to assist in establishing specifications. In most instances where the finish on carbide cutting tools is concerned, the present practice of the various tool manufacturers is accepted by the purchaser. In some of the newer applications there is a growing tendency to be more specific as to what type of surface will be required.

For example, the figures shown in Chart 1 indicate a varying set of conditions that can be obtained on carbide surfaces by specifying the type of diamond grinding wheel that is to be used. A 400-grit diamond wheel under normal operating conditions will provide a 4 to 5 micro-inch surface finish, as compared to the 9 to 20 micro-inch surface finish obtained with the 100-grit diamond wheel. Lapping of the surface after the 400-grit diamond grind will refine the surface even further to 3 to 3½ micro-inch surface finish.

Polishing this surface would then reduce the Profilometer reading on the surface to 2 to 2½ micro-inches or less. The range in finishes varies depending on the condition of the wheel,

Fig. 1. Although carbide polishing laps may be made of a variety of materials such as cast iron, steel, fiber, and even wax, the wood lap, as shown here, is the most easily adapted and usually the least expensive. Experience has demonstrated that maple wood is the most satisfactory.

condition of machine, and the type of grinding. For example, finer surfaces are usually obtained on cylindrical grinding as compared to flat grinding using the same grinding wheel specifications.

In some cases exceptionally fine finishes are required such as those needed on carbide rolls for rolling thin metallic sheets, and these specifications very frequently require highly polished surfaces that have a micro inch reading of one or less.

Fine finishes on carbide edges and carbide tools are no more difficult to obtain than similar edges and surfaces when the parts are made from other materials. Actually, flat surfaces are probably more easily obtained on carbide than on steel. It is necessary, of course, to utilize diamond lapping compounds when working with the carbides as compared to less expensive lapping mediums commonly used on steel and other metallic materials.

In producing fine finishes on carbide, it is necessary that the grinding and polishing operations be carried on in a succession of steps in which the diamond wheel grit is reduced as the grinding continues and the diamond particle size in the lapping compound is reduced as the lapping continues. For example, in grinding a carbide roll that would be used for finishing thin foil, a very fine surface finish is necessary.

In this instance, the cylindrical grinding would begin with a 100-grit diamond wheel until all of the molded surface has been cleaned up and the work is within 0.010″ of the final diameter. The diamond wheel would be changed at that point and a 220-grit wheel used which would reduce the work diameter to within .002″ to .003″ of size. Next, a 400-grit wheel would be used to bring the work within .001″ of specification. In most cases, lapping would begin at this point, using wood laps and a diamond lapping compound that would contain diamonds meeting the specifications required for the No. 15 U. S. Bureau of Standards grade, Chart II.

When the 400-grit grinding wheel marks are removed, the diamond lapping compound would be changed to No. 6 U. S. Bureau of Standards grade and, of course, the wood laps would also be replaced so that none of the larger diamond particles used in the previous step would scratch the work at this stage of the finishing and polishing operation. The No. 6 diamond dust would be utilized to remove the No. 15 scratches, and when this was accomplished new laps would be introduced using a No. 1 diamond dust. By following this succession of grinding and lapping operations, a very fine highly polished surface would result.

It is recognized from the above succession of operations that very fine finishes require time to accomplish and, consequently, the cost of the finished piece increases. It is for this

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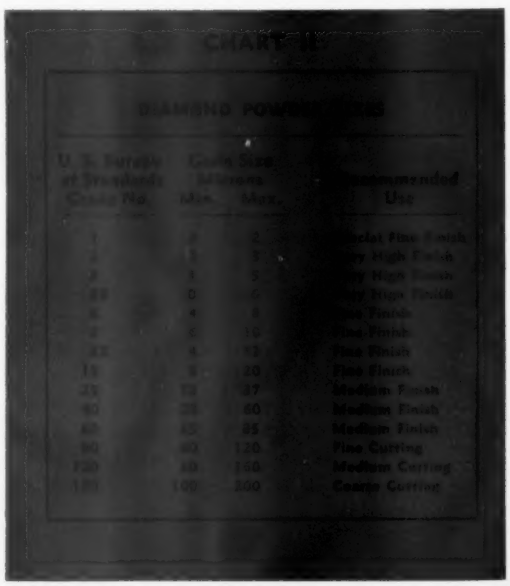


HOW THRUST FORCE AND DEFLECTION AFFECT DRILLING

THE DRILLING MACHINE, the fixtures, and the workpiece comprise the mechanical system used with twist drills. These three have two basic functions: (1) to feed the drill axially into the workpiece at a controlled rate, and (2) to rotate the drill at the desired speed. This article discusses the feeding function.

Thrust Force and Feeding Horsepower

Feeding a twist drill into a workpiece at a satisfactory rate requires an axial thrust force which is high in proportion to the size of the tool. For example, a ¾" drill operating at a feed of .012 ipr (inches per revolution) in an alloy steel of moderate hardness will develop a thrust force in excess of one ton when sharp — and appreciably more before it is considered dull. This high thrust force has only a negligible influence on the power requirements of the drilling machine because the penetration rate is relatively low. Operating the ¾" drill at .012 ipr at a speed of 250 RPM (50 SFM peripheral speed) gives a penetration rate of 3" per minute. Coupled with the thrust force of 2,000 lbs, this penetration rate requires a feeding power of only .015 horsepower. Rotation of the drill requires 1.5 to 1.8 horsepower, so the feeding power is seen to be less than 1% of the total drilling power. Thus, the feeding power is usually neglected when estimating drilling power requirements. Nevertheless, the thrust force is a major consideration in the design and selection of adequate drilling machines.

Reprinted from "Metal Cuttings", published by National Twist Drill & Tool Co.

The Nature of the Thrust Force

The thrust force developed by twist drills, unlike that of most other metal cutting tools, is made up of two distinct components. The first, due to the drill cutting edges (lips), is analogous to the normal force on most cutting tools. The other, and more important, is due to the chisel edge at the center of the drill point. This portion of the drill is literally forced into the work, and the workpiece metal under it is subjected to a complex process of chip formation and extrusion before it escapes into the drill flutes. Figures 1 and 2 are photomicrographs of workpiece sections perpendicular to the drill chisel edge, which show clearly the severe deformation of the metal structure. Such severe deformation indicates that high stresses

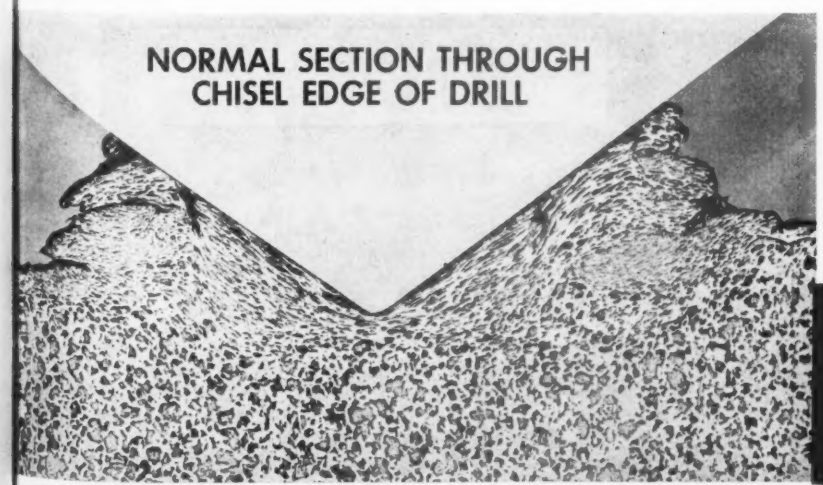
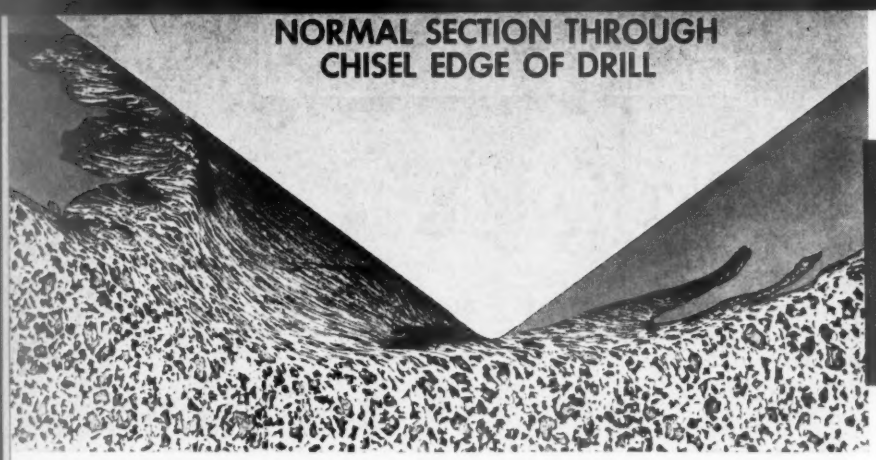


Fig. 1. Deformation under the drill chisel edge at the exact center of the hole



(and forces) are involved. Special dynamometer tests of regular design twist drills have shown that 50-65% of the total thrust force is due to the chisel edge, despite the fact that this portion of the drill removes less than 3% of the volume of the metal cut.

Deflection of Drilling Machines

Because of the high thrust forces developed in drilling, it is reasonable to expect some deflection of the drilling machine and fixtures. This deflection is of importance if it amounts to an appreciable part of the feed per revolution. An investigation of a 5 HP, 30″ manufacturing type of drilling machine of knee and column construction in good condition has shown that a thrust load of one ton can cause an axial deflection of more than .010″ between the table and the spindle, and a net change in angular spindle alignment of about .005″ per foot.*

Figure 3 shows the nature of this deflection, exaggerated. Radial drilling machines of equal capacity will deflect much more than this, while portal or bridge type machines are much stiffer. Average shop-worn machines will usually show much higher deflections.

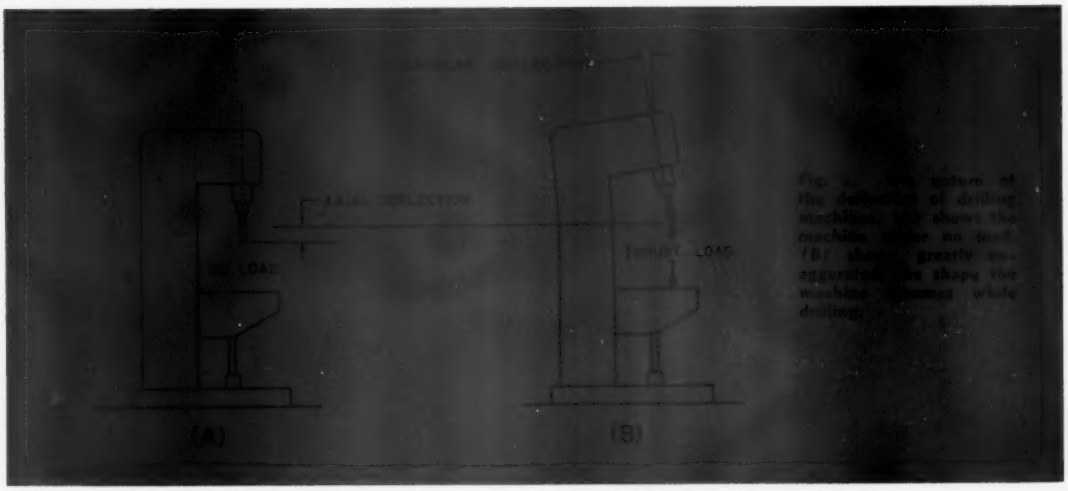
*"Practical Drilling Tests" by D. F. Galloway and I. S. Morton, Institution of Production Engineers, 1946.

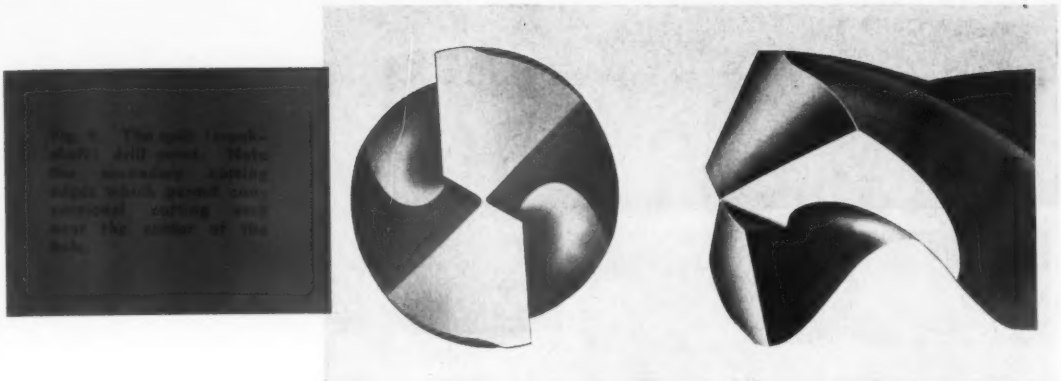
The Effect of Drilling Machine Deflection

On many machines, drill feed is not uniform throughout the drilling cycle, because of machine deflection which can easily exceed feed per revolution when the machines are operated within their rated capacity.

Upon contacting the workpiece, the drill does not start to cut until the machine, fixtures, and workpiece have deflected enough to develop the force required to force the chisel edge into the work. When this happens, the feed is further gradually retarded due to additional deflection until the entire point is buried in the work and the deflection is at a maximum. The drill then continues to cut at the set machine feed rate until it breaks through the bottom of the hole. Here the machine starts unloading so that there is a definite increase in feed rate all during the breakthrough of the drill point. Further, the change in angular spindle alignment causes a gradual shifting of hole direction during the start so that the holes will not be square with the workpiece surface. The use of excessively long drills can make this condition worse because of extra bending in the drills.

The decreased feed upon entry into the workpiece may not be too damaging unless the material has severe workhardening tendencies.





However, increased feed at the breakthrough can be very destructive because of increased loading of the drill cutting edges. Very often the breakthrough surface is scaly and hard; therefore breakage and chipping of drills are sometimes encountered at this point.

The angular misalignment of the spindle caused by thrust force can increase bellmouthing at the start of a hole and can cause excessive drill margin wear due to rubbing on the side of the hole. If bushings are used, they tend to straighten out the drill but there is a high side load on the drill causing high margin wear.

Chatter is encouraged by any type of deflection. Chatter is periodic loading and unloading of the cutting edges caused by non-uniformity of the workpiece material and lack of rigidity in the setup. In drilling, the chatter can be torional, axial, lateral, or any combination of these types.

Remedies For Deflection Troubles

The most obvious cure for deflection troubles is the use of rigid machines and setups with continual maintenance to see that they do not deteriorate. Fixture designs should provide support for the workpiece under the point of drilling to minimize deflection in the workpiece itself. This is a common and often overlooked source of trouble. Bushings should be accurately aligned with the spindle.

When existing non-rigid machines must be used, steps must be taken to reduce the deflection. A reduction in feed rate will help, although it severely reduces production. Feed must be reduced about 60% to halve the thrust load and deflection. Speed changes have no effect on thrust and deflection, but sometimes may help reduce chatter. Drill bushings may correct drill alignment but at the expense of excessive drill margin wear.

A more satisfactory method of reducing drill thrust and machine deflection is the use of the split (or crankshaft) point shown in Figure 4. This point permits the drill to cut conventional chips to almost the center of the hole; it greatly reduces the thrust load developed. Chip formation produced by this type of drill is shown in Figure 5.

In severe cases a multiple step operation may be necessary. A small hole of such diameter that the thrust and machine deflection are within allowable limits is first drilled through the workpiece. This hole is then enlarged to desired size with one or more three-or four-fluted core drills. The core drills will require much less thrust force because they do not cut to the center of the hole.

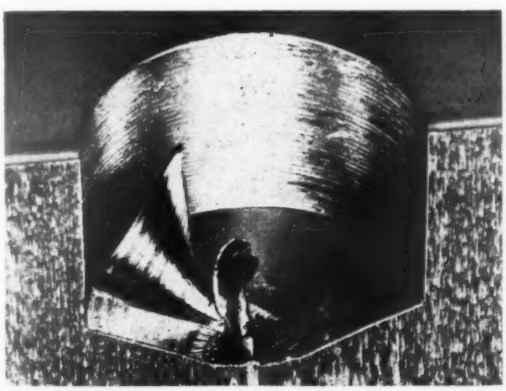
Through use of properly selected diameters for successive core drills, fairly large holes can be satisfactorily produced on equipment of limited capacity.

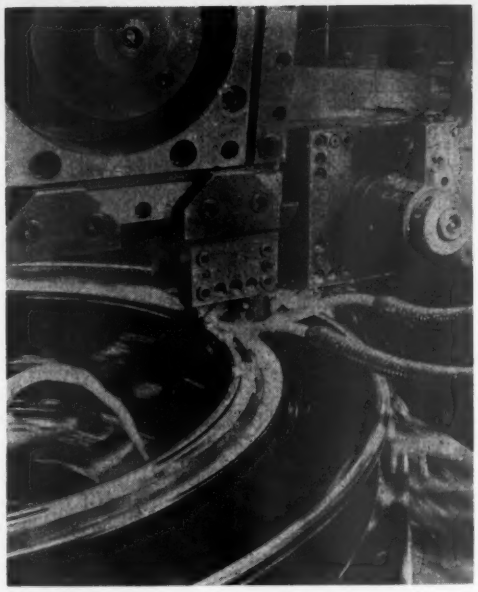
Conclusion

The thrust force and resulting deflection of a drilling setup requires careful attention in design and selection of equipment for successful, high production drilling operations.

Lack of rigidity will severely limit production capabilities and generally cannot be corrected after the setup is completed.

Fig. 5. A sectioned hole showing the chips produced by a split-pointed drill. The chip formed by the secondary cutting edge is shown adjacent to the main chip.





(Left) Close-up of rough and finish facing operation on inner ring of 36" stainless steel jet engine compressor frame at Thompson Products Inc. Carboloy grade 370 carbide in form of square inserts are used at 36 rpm to remove metal at 340 sfpm.

THE RIGHT TOOLING combination can't be beat when it comes to machining tough materials.

The Jet Division of Thompson Products, Inc., found this out recently, and licked a difficult machining problem involving 310 stainless steel jet engine compressor frames.

The result: Production jumped from 3 to 14 pieces per 8-hour shift.

Primary problem on the job was work hardening of the stainless steel — further complicated by weld spots and interruptions on the outside rim of the frames which eliminated the possibility of materially increasing feeds or speeds.

Because of part dimensions, it was not practical to increase feeds above 0.008". During one trial at a feed of 0.015", for example, excessive tool pressure caused the workpiece to distort. The tools were capable of withstanding the pressure, but the workpiece was not.

During a period of several months Thompson tool engineers applied 17 different grades of carbide to the job. They also shifted operations to a Bullard Man-Au-Trol vertical turret lathe and replaced brazed type tools with inserts.

Production still was a problem until Carboloy grade 370 carbide inserts were applied on the job. Tool life went up immediately, doubling on each operation.

With previous carbides only three or four pieces could be machined, then the carbides had to be reground. With the new carbide, it was possible to turn out as many as eight pieces before regrinding was necessary.

In regrinding the carbides used formerly, it was necessary to grind off ⅛" of metal, in order to remove the cracks that developed in the tips. Maximum metal removal during regrinding on Carboloy grade 370 carbide amounted to 1/16", in effect increasing useful tool life by almost 100%.

The work at Thompson Products consisted of rough and finish facing the inner ring of the 36" piece in the first operation. On this job, grade 370 carbide tools were used in the form of square inserts. They were applied at a feed of 0.008" and adjusted for a depth of cut of 0.100" at 36 rpm, to remove metal at 340 sfpm.

A similar Carboloy grade 370 square insert was used in the second operation which called for rough and finish facing the inner band. Feed, depth of cut, and speed remained the same but metal removal decreased to 260 sfpm.

The grade 370 carbide also took the third operation in its stride — even though an interrupted cut was involved in rough and finish facing the outer ring at the same feed, depth of cut, and speed applied in the other two operations.

The new carbide worked equally as well in two subsequent operations — breaking down and turning. In these, the tools were triangular shaped and were fed into the work at a feed of 0.005" at 36 rpm. Coolant was used in all operations.

Why use cast iron grades on steel and steel grades on cast iron? Here's why.

by Paul H. Miller
Research Engineeer
WESSON COMPANY
Detroit, Michigan

GUIDES FOR SELECTING CARBIDE GRADES

WHILE THE BASIC ingredients of cemented carbides have changed little over the past 20 years, significant advances in metallurgy and processing techniques have resulted in the creation of an increasingly wider selection of carbides.

Although most of these carbide grades have been created to perform specific functions, the increase in number and types of grades has tended to confuse rather than simplify grade selection. To date there has been developed no clear cut or foolproof method of selecting the best grade for any job and the pitfalls inherent in selecting the wrong grade are still as numerous as ever.

Certainly one of the greatest hazards in grade selection stems from the over-simplified classifying of certain grades as "steel cutting" and other grades as "cast iron" grades. It is true that some carbide grades are most popularly used in machining certain materials and other grades for different materials. To assume that this common practice is based on sound fundamentals, however, is erroneous. It is the result of an over-simplified arbitrary grouping. In general, this grouping divides most carbides into two distinct categories:

Type A—Grades for cutting cast iron and non-ferrous materials.

Type B—Grades for cutting steel.

With such an over-simplified basis for grade selection, seemingly inexplainable contradictions arise when cast iron cutting grades are observed to be outperforming steel cutting grades on steel applications. This same confusion occurs where steel grades are machining cast iron successfully.

Actually these inconsistencies are readily explainable and would seem to indicate that any across-the-board classification of carbides on the basis of their most popular fields of use can only be generalizations at best.

A much more realistic picture of cemented carbides is obtained by grouping them on the basis of their own distinct metallurgical types rather than on the basis of their end use. Carbides can then be grouped as follows:

Group I—Straight tungsten grades

Group II—Compound carbide grades

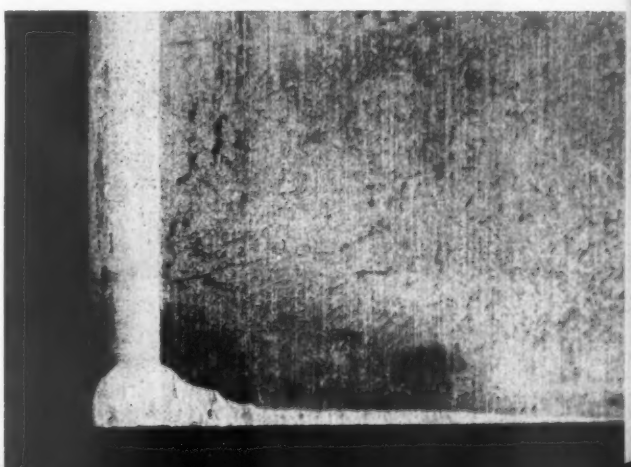


Fig. 1. The carbide insert right illustrates the typical abrasive wear land which is a characteristic development of most carbide machining of cast iron and non-ferrous materials.

When the problem is primarily one of resisting abrasive wear on the tool flank, a Group I carbide will invariably be found superior. The combination of tungsten carbide and cobalt binder provides a carbide metal possessing maximum resistance to abrasive wear.

The machining of most cast iron and nonferrous materials is characterized by the development of a wear land below the cutting edge as illustrated in Figure 1, and tool cratering is either non-existent or of minor importance. Under these circumstances, the Group I carbides meet the requirements better than the Group II carbides.

The outstanding characteristic of the compound or Group II carbides is their superior ability to resist cratering or grooving in the tool face back of the cutting edge on steel machining applications.

Figure 2 illustrates a typical crater formation on a Group II carbide produced by a steel chip. On the same application, a Group I carbide would have cratered much more severely.

With a better understanding of the mechanism of cratering and a knowledge of the relationship, between cratering and the chemical composition of the cemented carbides, we feel certain that some of the problems of grade application can be simplified. This knowledge will also serve to explain the apparent contradictions mentioned above in connection with the use of Group I carbides on certain steel machining jobs and Group II carbides for cutting cast irons.

The fact that Group II carbides, containing titanium carbide in addition to tungsten carbide, are able to resist cratering better than the Group I carbides had been recognized ever since the development of the compound carbides, but it has only been quite recently that a sound explanation for this phenomenon has been developed.

Fig. 2. The enlarged view of this carbide insert cutting edge clearly shows the cratering which results from the chemical attack at the chip interface on steel cutting applications.

The thorough endeavor of the English investigator, Trent[1], has served to throw more light on this rather complex subject than any previous efforts known. Trent demonstrated that at temperatures near 2370°F steel and tungsten carbide unite to form an alloy having a lower melting point than either individual ingredient. This chemical action goes on continuously while removing a steel chip at the speeds conventionally employed for carbide tools. The forming of the lower melting point alloy at the contact area between the chip and tool and its continuous wiping away appears to account for crater development in the carbide tool face.

Trent also discovered that titanium-tungsten carbide grains are not as susceptible to chemical attack by steel under high temperature conditions as are tungsten carbide grains. The presence of even a small percentage of titanium carbide appears to greatly reduce the chemical attack and explains the great superiority of the Group II carbides in resisting crater formation when cutting steel.

To determine whether temperatures as high as 2370°F actually develop at the tool-chip interface has proved to be a very complex problem. Many investigators have attacked the problem and temperatures as high as 1830°F have been reported. Since such readings are primarily an average temperature at the tool nose, there is valid reason to expect that considerably higher temperatures occur at localized portions of the tool-chip interface.

Further evidence that temperatures in the neighborhood of 2370°F are developed is supplied by the observation that deformation of the carbide tip as shown in Figure 3, is commonly observed even under moderate conditions of cutting speed and chip cross-sectional area. For such deformation to occur under moderate chip loads, temperatures well over 2000°F must certainly exist.

From experience in bending carbide strips and rods we also know that the carbide must be heated to over 2000°F to assure deformation without fracture. These observations all add up to strongly confirm the validity of Trent's explanation of crater formation when machining steel.

On the basis of this explanation, we can conclude that tool wear by cratering will pre-

dominate over abrasive or flank wear when a steel chip contacts an extremely hot carbide tip. Similarly, a cast iron or cast iron alloy which would develop similar temperatures would produce a crater type of wear.

Common gray iron which machines with a short crumbled chip does not produce extreme temperatures and therefore does not give rise to cratering to any significant degree. The absence of high temperatures is indicated by the tool remaining black or producing only a dull glow during the cutting process.

Alloy cast irons of the high strength type which produce a curled or semi-curled chip develop conditions at the tool point quite analogous to those produced in machining steel. On many such applications, the carbide tip can be seen to glow quite brightly and deformation of the carbide under pressure of the cutting load is usually observed upon close examination of a worn tool. When a Group I carbide is employed on high strength cast irons under these conditions, the cratering type of tool wear is usually more predominant than flank or abrasive wear.

This would indicate that a Group II carbide with its inherent resistance to cratering should be applied. Many carbide performance records submitted by Wesson field engineers prove that Group II carbides are superior to Group I carbides on those alloy iron applications where a curled or semi-curled chip is produced under high temperature conditions.

The opposite condition prevails on certain types of steel cutting jobs. The most common illustration of this is found in the almost universal acceptance of Group I carbides for reaming steel.

In reaming steel, it is usually impractical to employ high cutting speeds because of mechanical conditions which develop chatter and similar secondary problems. Speeds in the range of 50 to 150 feet per minute are usually most effective for steel reaming operations.

In this speed range and with the low feed per tooth of .002″ to .005″ usually employed, the temperatures developed are quite low. The thin chip in contact with the carbide at low temperatures minimizes any cratering tendency and tool wear occurs as the development of a wear land below the cutting edge.

It can be concluded that under these conditions — in spite of the fact that the material being machined is steel — the Group I carbides are superior. The specific type that has proved superior for reaming steel is a 94% tungsten carbide plus 6% cobalt type such as Wesson-metal Grade GI.

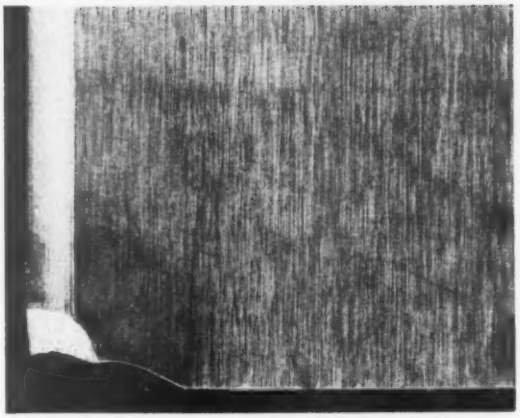


Fig. 3. That temperatures at the chip interface exceed 2300° F on many applications is borne out by the slight "deformation" of the carbide insert edge. This is proved by the 2000° F necessary to deform carbides without fracture in bending strips and rods.

Still another operation that is best accomplished by a Group I carbide is single flute drilling commonly known as gun drilling. With this tool, steel is cut with a feed of approximately .001″ per revolution and the thin chip produces an abrasive type of wear. The Group II carbides prove inferior under these conditions since they provide less resistance to abrasive wear than the Group I carbides.

In keeping with the principles outlined and examples stated, the following practical rules for grade selection can be set down:

(1) Cast irons which produce a curled or semi-curled chip are usually best machined with a Group II carbide when the speed is sufficient to generate HIGH cutting temperatures. At low speeds, the temperatures remain low and the Group I carbides offer greater wear resistance.

(2) Steel cutting jobs performed at relatively low speeds and with a thin chip are best done by a Group I carbide. Two examples of such jobs are reaming and gun drilling steel.

With the constantly changing pattern of new and improved metals coming into industrial use, it has been necessary for carbide producers to engage in continuous research directed toward both improved carbides and more adequate knowledge of the fields and principles of application.

Until some "wonder" carbide can be developed, obsoleting the present need for a large variety of carbides, such efforts must continue.

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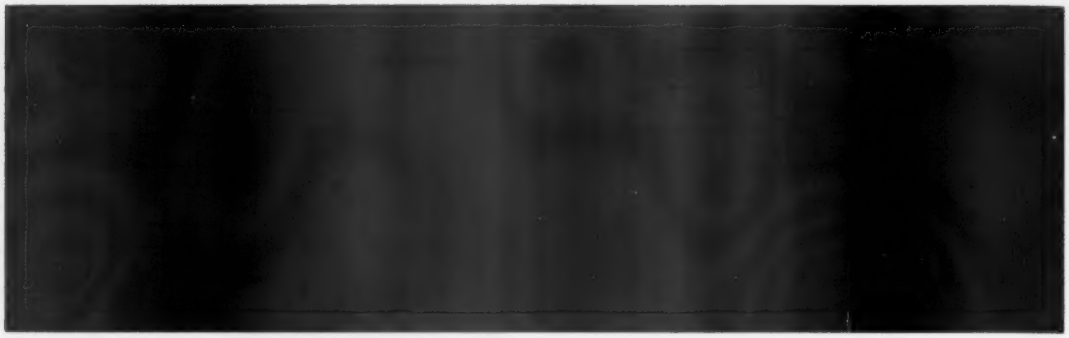


CARBIDE INSERT TOOLS CUT MACHINING COSTS

CONVERTING from conventional brazed carbide tipped tools to mechanically held carbide insert tool holders, for rough turning of heavy duty steel axle shafts on only two machines, has cut tool costs $13,550 per year for a large builder of road machinery. Using two 16" Fay Automatics, complete roughing operations are performed in four setups.

Output per tool grind increased from 30 to 100, an improvement of 333%, when Wesson band-type Multicuts, designed specifically for facing, plunge feed turning, and chamfering operations, replaced the tools formerly used. Wessonmetal carbide Grade WH is being used with the new tool setup.

Average depth of cut on all setups is ¼" with a feed of .012 and speed of 550 fpm.

Roughing operation No. 1, performed on the first machine, consists of the first rough turning of the oil seal, bearing and gear diameter. In this first setup, three Multicut holders enter the cut simultaneously with tool #1 entering the cut at the gear end of the shaft. Tool #3 plunge cuts on the gear diameter and turns to a shoulder on the wheel diameter.

The shaft is then removed and placed in adjacent machine No. 2 where the same turning operations are performed on the opposite end of the shaft. In addition, two holders mounted on a back slide feed in to chamfer the edges of the wheel diameter.

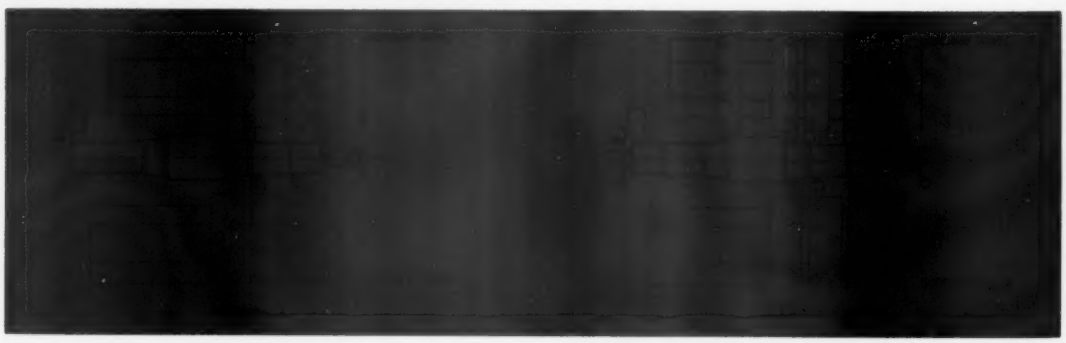
Before proceeding with the third and fourth operations, approximately 500 shafts are machined on the two machines. Tool setups are then changed for the two final roughing operations using setup No. 3 and No. 4.

Setup No. 3 consists of final roughing of the gear diameter. Tool #2 rough turns the step diameter on which a spacer is placed to hold an oil seal bearing on the roller bearing diameter. Final roughing of this diameter is also performed at this station.

Opposing these tools on this station are three chamfering tools mounted on the back slide. These tools feed in and chamfer all three diameters.

In the final roughing operation in setup No. 4, the turning operations are repeated on the opposite end of the shaft. However, two additional holders in this setup straddle turn an undercut on the wheel diameter for the oil seal.

A total of seven pounds of stock are removed from the forging during all four operations.



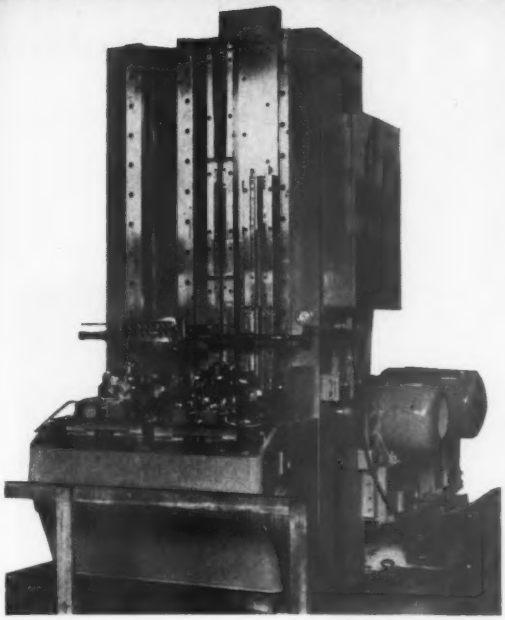


Fig. 1. Representative of the new line of broaching machines built by the Detroit Broach Company is this vertical, 15-ton, dual ram machine. Its speed is adjustable from 8 to 120 fpm, and stroke can be varied between 12 and 100 inches. As shown, this machine is tooled for four operations on Stellite turbine blades, i.e., (1) square ends, (2) rough and finish "Xmas tree" root, (3) square up the tang side, and (4) finish bottom of tang.

New Broaching Machine Design Recognizes Carbide Requirements

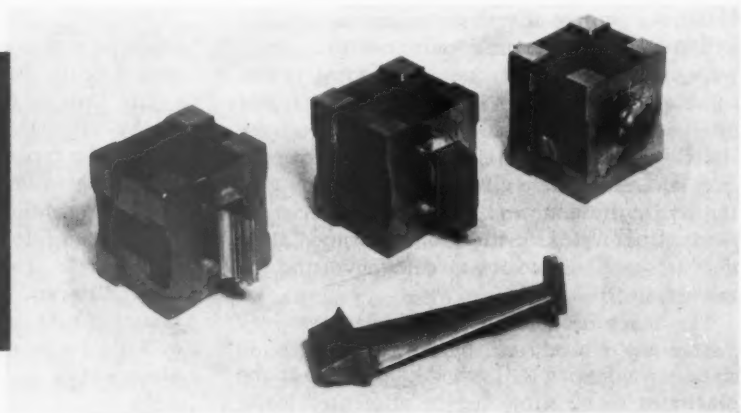
THE BROACHING machines newly developed and introduced by the Detroit Broach Company represent a most interesting, yet logical, transition from toolmaking to machine tool making.

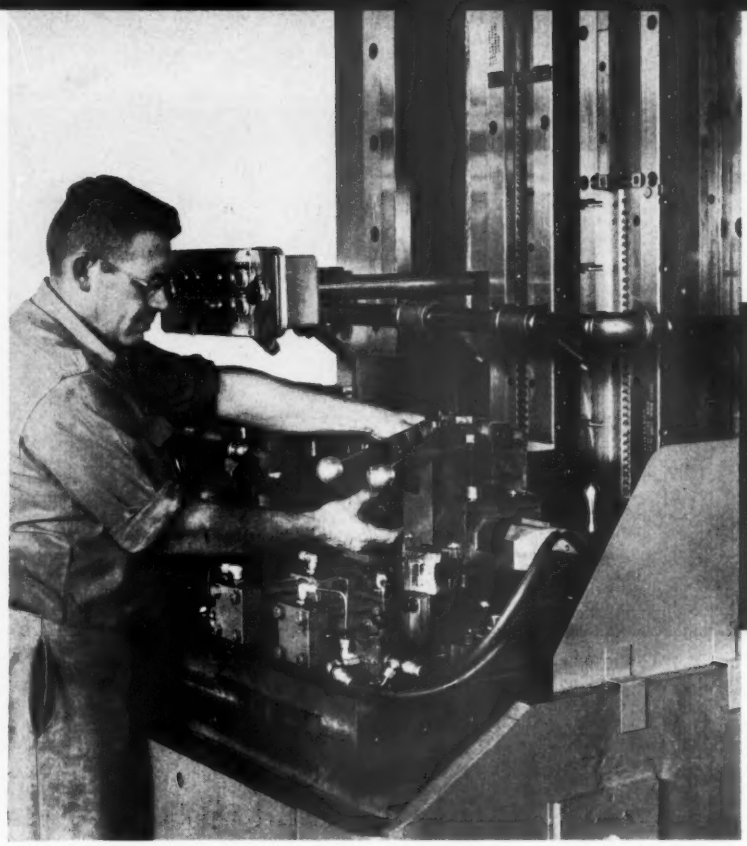
It stands to reason that a concern well-versed in the building of a great variety of broaching tools for a great variety of broaching jobs would come up with very definite ideas as to what should be expected, performance-wise, of a broaching machine. The engineering design and construction of Detroit Broach machines embody the features that the company feels are essential to realizing performance expectations of the highest order.

The very things which, today, make for a good broaching job, also make for good carbide broaching, i. e., great rigidity and freedom from vibration. This applies not only to the machine itself, but in the work-holding fixtures and in the tooling.

These new machines not only embody great rigidity, but great emphasis has been placed on the elimination of vibration, not so much by absorbing vibration but by preventing the setting up of vibration.

This has been brought about, in part, by extreme simplification of the hydraulic circuitry. Less valving and less hydraulic interdependence between a multiplicity of machine





movements contribute both to elimination of chatter sources and to simplicity of maintenance.

All of the design precautions which have been embodied in these machines to insure success with high speed steel broaching tools apply particularly to insuring trouble-free operation with carbide tooling. Chattering slides, slide deflections and work table deflections, as intolerable as they are for high speed steel tooling, are even more so with carbides. With a design which eliminates these sources of trouble, it is possible to increase h.s.s. broaching speeds and to operate at optimum speeds most compatible for carbides.

Detroit Broach engineers have recognized also, that as higher broaching speeds are provided, the control of such auxiliary movements as shuttle tables becomes more critical. They have, therefore, split the knee construction completely apart from the slide motions, and used a separate source of power. Thus the shuttle table circuit is completely divorced from the main slide circuit. This means that the hydraulic action (and reaction) forces attendant upon the shuttle table movements are not "telegraphed" to the circuits actuating the main tool-driving slide.

The machine columns and knees are very generously ribbed, and hardened and ground square ways with full gib take-up permit the machines to be subjected to off-center loads, if necessary, with an absolute minimum of measurable deflection. Although these rigidity features, in combination with preloaded slides, which run within 0.0005" through their entire stroke, contribute to a very high work overload capacity, the most beneficial result is a freedom from any tendency of the slides to settle over night, causing an "out-of-time" morning start which could smash a set of tools. As important as this is in the case of high speed steel tooling, it is even more critical when using (and paying for) carbides.

Another feature that the Detroit Broach engineers incorporated in the new machines is one whereby the rams are in tension, never in compression. This tends to steady the stroke and contributes greatly to vibrationless and chatterless operation. Again, this thinking, based on successful experience with high speed steel tooling, pays off in carbide performance.

The Detroit Broach line includes machines of the vertical, single and twin ram, surface broaching types, vertical down pull internal broaching machines, as well as horizontal internal broaching machines. Tonnage capacities range from 5 to 50, with strokes of from 36 to 100 inches. The hydraulic power equipment is by "Oilgear". All machines are equipped for selective manual inching, and semi-automatic or fully automatic cycling. The hydraulic and electrical equipment conforms to J.I.C. standards.

Electronic control of processes is the key to the most advanced methods in carbide technology. The apparatus shown supplies current under critical tolerances to the huge induction coils that supply energy for heating a vacuum sintering furnace.

NEW MANUFACTURING TECHNIQUES

Assure Maximum Carbide Utility

by Alfred D. Stevens

Manager of Quality Control, VALENITE METALS CORPORATION, Royal Oak, Michigan

TODAY'S TUNGSTEN CARBIDE manufacturing plant is considerably different from the plant of a few years back. And so is the quality of carbide tools and the on-the-job performance they will give.

Not long ago the carbides were inclined to behave erratically. But today's superior carbide plants, equipment and techniques have brought about significant changes, and carbide can now be produced to consistent high standards. Most of the headaches that were formerly involved in using carbides have been cured.

To a great extent the cure has resulted from the extensive redesign of fabricating machinery and the creation of a new kind of plant, designed from the ground up for the specific purpose of producing higher quality carbide. Methods of metallurgical control have also greatly advanced.

There are only a few carbide manufacturing plants. Consequently, for many years the industry had to depend to a large extent on equipment adapted from that used in other industries. Ball mills, for example, came from the paint and ceramic industries. Tableting presses were originally designed for use in the drug industry. Furnaces were adaptations of atmosphere-controlled heat treating furnaces.

But today the steadily-increasing use of carbide — not only for tools, but for wear parts, dies and many other purposes — has begun to make it economically advisable for carbide manufacturers to have equipment designed and built for the sole purpose of processing carbides. Not only this, but plant structures and buildings of a new type have appeared in the carbide industry.

The processes used today by manufacturers of carbides are basically similar up to the sintering stage. An outline of the methods used will help illustrate some of the steps now being taken to assure carbide users of consistently dependable tool performance.

First order of business for the producer of high quality carbide is to protect the purity of the materials. Contamination by dust and foreign substances invariably results in a weakened physical structure. Dust particles, for example, burn out in the sintering process and leave damaging voids in the part.

Valenite Metals Corporation, as the most recently constructed carbides plant, will illus-

Although the internal temperature of this carburizing furnace is closely controlled by an elaborate electronic setup, it is frequently rechecked with the optical pyrometer. The helical tube around the furnace is an electronic induction coil, which supplies energy for heating the tungsten-carbon mix.

trate the care now taken to avoid contamination. First, the plant was deliberately located in a rural area which was quite free from atmospheric industrial contaminations. The plant itself was built as an exterior shell, sealed against intrusion of outside dust, and only filtered air is permitted to enter. Then the interior is divided into one large production area and a number of smaller, individually-sealed compartments — one for each of the steps in the process where contamination is most possible. Air for these compartments is drawn from the general plant interior and passes through double filter banks before entering them. The air is kept at slightly more than atmospheric pressure throughout the plant, and somewhat higher within the smaller compartments, so that an air leak or the opening of a door will not admit dust.

Material in process is restricted to the smaller pressurized compartments. Workers may not smoke in these areas and must wear dust and lint-free clothing.

The first steps in making cemented tungsten carbides are the reduction of cobalt oxide to metallic cobalt and the carburization of tungsten. To reduce the cobalt oxide the material is placed in "boats" of a special heat and corrosion resistant alloy which move through a continuous-type furnace. Here high-purity hydrogen at elevated temperatures combines with the oxide, leaving pure metallic cobalt.

The cobalt enables formation of the carbide-to-carbide bond. Incomplete reduction of the cobalt is very detrimental and results in a comparatively fragile part. The operation has been much improved by a better design for the furnace. The furnace is a complete-muffle type, electrically heated, and electronically controlled. A further gain in quality has been made by the use of improved instrumentation to meter the hydrogen.

In the carburization process a mixture of metallic tungsten powder and amorphous carbon are made to combine by heating them together to the temperature of molten steel. Older methods of performing this operation called for heating the mixed materials in a hydrogen-atmosphere furnace. Although this method has been a standby for some time, it results in the inclusion of unwanted byproducts with the carburized tungsten.

Advanced methods of performing the carburizing operation, as used in the Valenite plant, depend on the use of a special electronic induction furnace. The intimately-mixed tungsten and carbon powders are charged into a graphite crucible. The temperature of the crucible and its contents is raised through a closely-controlled cycle. The objective is to secure a complete chemical reaction and control the grain growth. The induction coils used in this operation are more than 2' in diameter. The power source is a motor generator set whose output is electronically controlled.

The next major processing step is the mixing of tungsten carbide and cobalt into the proper proportions for the grade desired. Here, too, refinements have been made that assure greater accuracy of composition. (Where additional carbides — viz. titanium carbide — are required for specific grades, the procedure will include extra steps not described here.)

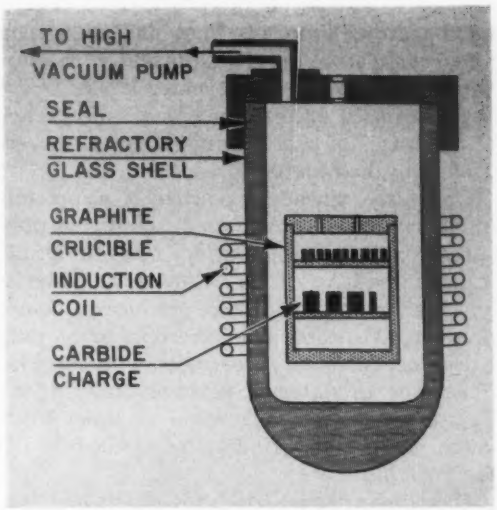
Ball milling is the next, and most time-consuming, operation in the entire cycle. Ball milling equipment now being used was special-

The apparatus shown (left) is a sub-sieve sizer, which is used to check particle size on batches of carbide powder. Particle size, after seven days or more of ball milling, is so small that the powder will flow freely through a screen with openings so fine they will hold water.

ly designed and built for ruggedness and to exclude entry of any contaminants during the ball milling cycle, which may last seven days or more. Another important consideration in the design of the equipment was control of the milling speed to that which is most suitable for carbides.

In processing Valenite, the mills are completely filled with naphtha after charging. This is done to exclude air and avoid oxidation. Water is commonly used for this purpose but Valenite prefers to use naphtha since it will carry less dissolved oxygen than any other common liquid. Naphtha, of course, is a hazardous fluid and great precautions must be taken in its use. However, it is believed that its use makes a material contribution to the consistent quality of the finished product.

Great care must be taken in emptying the mills to avoid contamination. This is a sealed-room operation and all equipment is stainless steel, carefully rinsed in naphtha from time to time. An additional screening operation is interspersed at the end of the cycle to make certain that no large particles are included with the powder. The screen used is so fine it would hold water, but the naphtha carbide mix will flow through freely. Following the screening, the excess naphtha is decanted from the heavy carbide, which settles to the bottom of a stainless steel vessel. At this point, to prevent oxidation of the finely divided material and to facilitate forming of desired shapes, a controlled small amount of paraffin is added to the naphtha carbide slurry. Then the naphtha is evaporated; the paraffin coats the carbide particles, protecting them from the air.

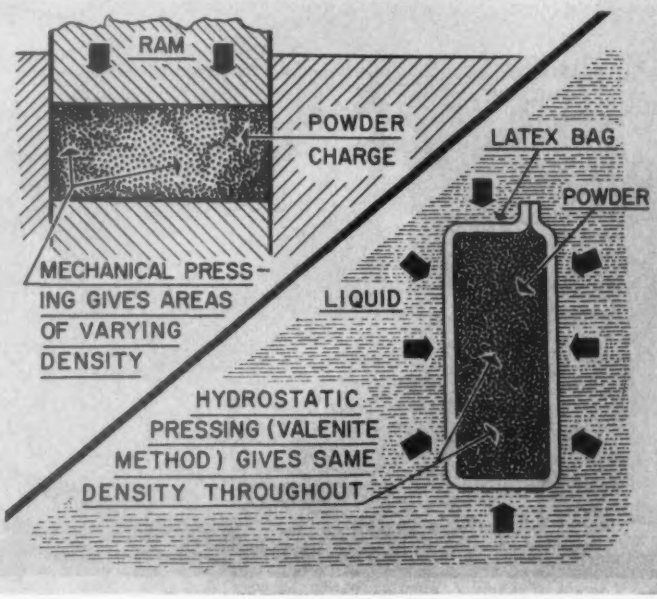


Schematic of a typical vacuum sintering furnace. Vacuum sintering offers the advantages of eliminating oxidation of the material during the cycle, and many engineers believe that it is superior to hydrogen atmosphere sintering in that it avoids the possibility of formation of hydrides or unwanted hydrogen by-products in the material.

Two procedures are commonly used for producing useful carbide shapes, ready for the sintering furnace. One of these is pill pressing to final shape in a tableting machine. The other is production of relatively large-size billets for further shaping.

The method used at Valenite is hydrostatic impacting of the powder into a billet. The procedure starts with the powder being placed in a latex bag and roughly compacted into approximate shapes through the use of light,

Comparison of conventional mechanical pressing with the newer hydrostatic impacting. The carbide powder is placed in a latex bag and is molded to an approximate shape. Then the bag is immersed in a liquid and put under extreme pressure. In the Valenite process, a series of impacts is applied.



hand-operated fixtures. Then the bag is completely immersed in a liquid inside a "pressure bomb" and subjected to repeated impacts. The pressures used exceed those that would result in the barrel of a 16-inch naval gun if it were fired with the muzzle closed.

Obviously, since the powder is completely immersed in the pressurized liquid, the pressure is exerted on the powder mass uniformly in all directions. It is believed by Valenite engineers that this method produces a denser product that is free from the lamination difficulties occasionally experienced with carbides. Shrinkage in sintering is more uniform, too. This permits powder forming to closer tolerances so that less grinding stock need be left for finishing.

From the pressure bomb the billets go to the third of the sealed rooms. Here the billet is reduced to the desired sizes and shapes on specially-designed machines. The circular saws, bevel grinders, surface grinders, lathes and other equipment used is quite similar in operation to general purpose equipment of this type. However, important design changes have been made. Mostly, these modifications have to do with increased accuracy and efficiency. However, close attention has been paid to protection of wearing surfaces from the highly abrasive carbide particles. Standard equipment would last only a short time in this service.

For the smallest blanks required in large quantities, hydrostatic impacted billets may be pulverized and the desired shapes then obtained by pill pressing.

The formed pieces, still in the soft stage, are now placed on a graphite tray and lowered into the furnace. Recent developments in furnace design and operation use high vacuum techniques and electronic induction heating. A vacuum on the order of 50 microns of absolute pressure is obtained. These conditions contribute extensively to reduction of porosity and help retain the purity of the material. Damaging oxidation is effectively eliminated by the vacuum sintering method.

Sintering temperatures approach 3000° F. Close control of the heating and cooling cycle is gained by the use of an elaborate system of electronic equipment. The sintering cycle and the length of the stay in the furnace are determined by the analysis of the material and the properties desired in the finished piece.

When the furnace returns to room temperature, the charge is removed and the carbide parts are ready for use as the hardest man-

One of the key quality control inspections on carbide blanks is hardness testing. Special standards of accuracy are required in the diamond penetrator. Because of the extreme hardness of the carbide, the diamond penetrator is apt to chip. Consequently it is checked after each test by reference to a standard hardness block of tungsten carbide.

The stereoscopic microscope is an indispensable tool in fractology, or the study of fractures. All specimens from the transverse rupture test are analyzed this way. Interpretation of results is an art as well as a science and requires long experience.

made tool material.

As well as improving processing techniques, more critical demands by users in recent years have caused carbide manufacturers to develop better methods of quality control. It has been demonstrated, for example, that chemical analysis alone will not assure a satisfactory product and physical properties can vary considerably for a given chemical analysis. For any analysis there is an optimum combination of physical properties. Newer quality control methods enable the manufacturer to consistently produce materials of maximum utility.

The critical indicators of quality in carbide materials are hardness, transverse rupture strength, and structure. These factors are interdependent and must be measured against each other in a critical evaluation.

Hardness is normally measured on the Rockwell "A" scale and varies between 85 and 93 in commercial materials. Brittleness of the carbide and the diamond penetrator requires constant reference to standard carbide hardness blocks. The requirements of accuracy of the diamond penetrator dimensions are considerably greater than that required in testing other materials. In recent years, equipment manufacturers have been induced to supply instruments that will meet the requirements. This has aided the testing program.

Transverse rupture strength is a good indicator of carbide quality. This test has been in use for some years and has been standardized and refined to great reliability.

The common methods of investigating the structure of the carbide are measurement of porosity and evaluation of etched structure. The most recent development has been correlation of porosity with tool performance.

It should be understood that the term "porosity" as used in carbide technology does not apply to the gross voids left by burnout of foreign material, such as dust, during the sintering cycle. Rather it refers to a minute microscopic porosity which is characteristic of the individual lot of material.

It has become apparent that each metalworking operation has a maximum tolerable porosity. Valenite's method of porosity determination is in accordance with new tentative standards of the A.S.T.M. For these investigations, the latest and most advanced metallographic equipment is employed.

As a result of all these advances in carbide technology, carbide materials available today offer the user far more utility and dependability than ever before. We at Valenite believe that when full advantage is generally taken of the new techniques and facilities the applications of the man-made miracle metal will broaden extensively.

Special Lathe Control Extensions Simplify Operator's Job

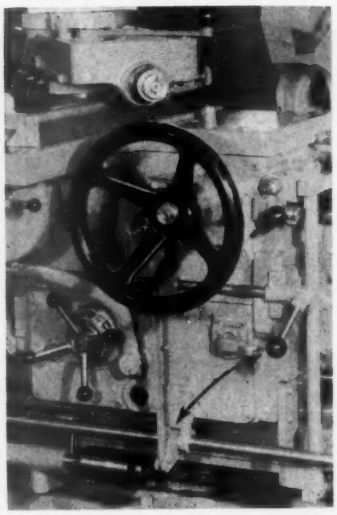


Fig. 1. Emergency stop control on saddle type turret lathe makes it convenient to stop the machine from almost any position. The arrows indicate the linkage train.

RECENT EMPHASIS in industry on increased output and quality control has brought about some special changes in the location of controls on turret lathes.

It has been found that the machine operator can do a better job with his machine, finish his shift less fatigued, and often reduce scrap loss by the simple procedure of making it possible for him to control the operations of his machine away from the headstock. While it is true that certain controls have always been mounted on the lathe carriage, the duplication of some of the basic machine controls at a point away from the headstock has proved beneficial.

An example of this technique is to be found in an emergency stop control on a Gisholt 4L saddle type turret lathe, Figure 1. This machine was an extra large capacity, extra length bed machine and the customer felt it necessary to provide emergency stop controls at both the compound cross slide carriage and the hexagon turret carriage aprons. This was done by a simple mechanical linkage which is shown in the photograph. In the photo the lever is down indicating that the motor is stopped. The lever is up when the machine is running and the operator can stop the spindle at the headstock or either carriage apron.

In Figure 2 an operator is using a push button control panel mounted on a movable standard that can be placed wherever it is most convenient. This control makes it possible for him to have complete command of all movements of the machine while in a position to keep a close watch on the workpiece as it is cut.

A similar device that has been developed for the remote control of turret lathes is shown in

. . . Continued on page 136

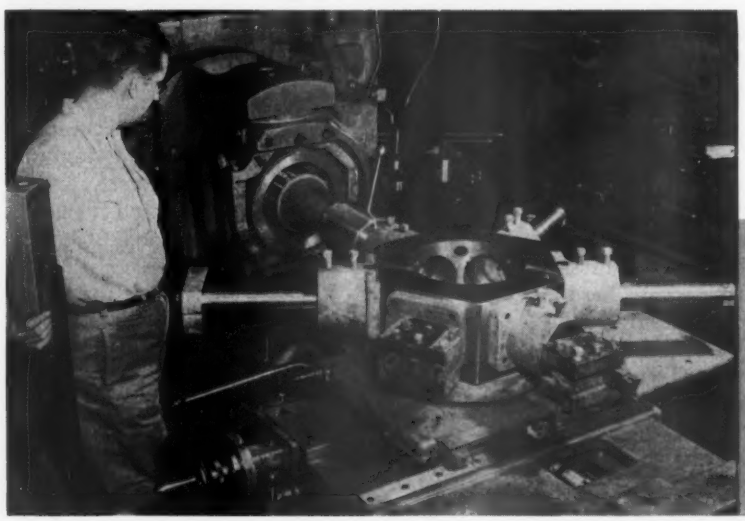
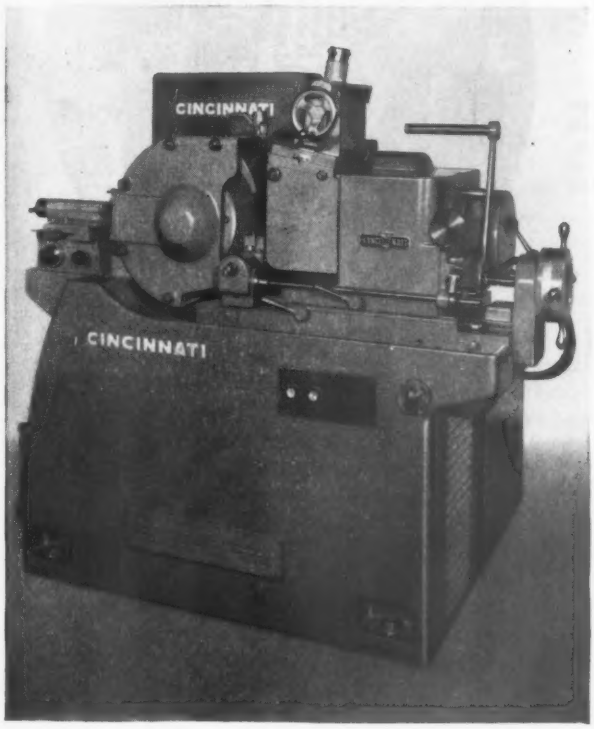


Fig. 2. On heavy work of this type it is advantageous to be able to control spindle motion while watching the workpiece.

You'll find New Profit Possibilities

in NEW CINCINNATI FILMATIC

No. 0 CENTERLESS GRINDERS



CINCINNATI FILMATIC No. 0 Centerless Grinder. Catalog No. G-640.

In the small parts precision grinding category, a substantial profit potential will be found in the new CINCINNATI FILMATIC No. 0 Centerless Grinder. Exclusive Cincinnati features, based upon 33 years of centerless experience, have been retained: Filmatic grinding wheel spindle bearings; "bed-rock" mounting of grinding wheel spindle; simple, direct truing of wheels. And now Cincinnati offers new advantages such as extra low maintenance with hardened and ground slideways and oil-shot lubrication; an extra measure of production with handwheel selection of infinitely variable regulating wheel speeds; higher quality finish and closer limits of accuracy than ever before. Catalog No. G-640 contains the complete story. Write for a copy today.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

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CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 971

CARBIDE TOOL SOLVES A FLASH-TRIMMING PROBLEM

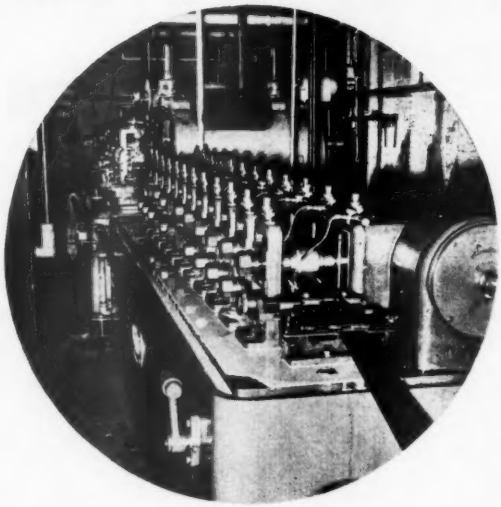
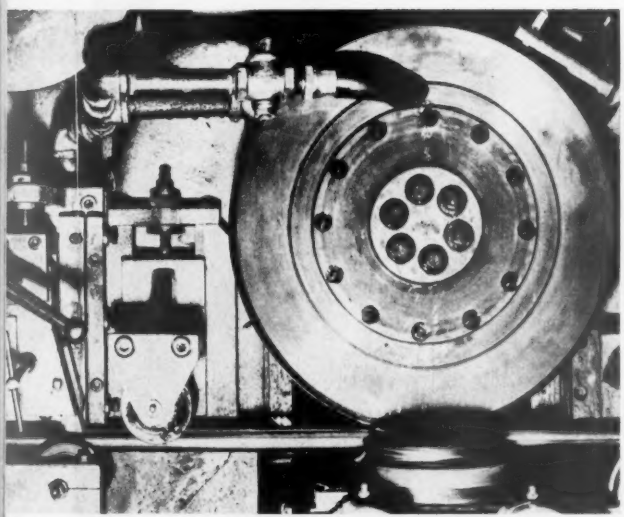


Fig. 1. Start of tube forming operation at Bissell Carpet Sweeper Co., Grand Rapids, Mich. Here cold-rolled steel 0.028 to 0.035 gage is formed in ⅞" and ½" tubing on this 12-stand mill for sweeper handles.

BEING PARTICULAR about the tools you use, and learning what characteristics they have to offer — especially when cemented carbides are involved — can make considerable difference in your costs — not only from the purchasing standpoint but also production-wise.

A case in point is the Bissell Carpet Sweeper Co., Grand Rapids, Michigan. By learning to use a standard off-the-shelf carbide tool in its tube forming operations, it is saving the price difference of a special tool, besides increasing production by 10%.



The operation at Bissell involves forming tubes of cold-rolled steel — used for home carpet sweeper handles. The company uses 0.028 and 0.035 gage steel to form its ⅞" and ½" tubing respectively. The steel stock is unrolled from coils 36" wide, then slit into 2.790" widths for the ⅞" tubing and 1.560" widths for the ½" size.

After recoiling the slit steel, it is positioned at the end of a small 12-stand forming mill, Figure 1. As the steel travels through the mill it is gradually shaped. By the time it reaches the 12th stand, it is formed into tubing; then passed directly to a 75 kva Yoder seamless welder, Figure 2.

Before the tubing passes on to the sizing and cutoff operation, it undergoes a flash-trimming operation. This was the trouble-point in the line.

Since flash trimming is done right after the welding operation, high heat (about 2400°F) and the continuous cutting caused steel tools to wear rapidly. The whole operation had to be stopped after running through about 1000' of tubing. More time was lost in changing tools

. . . *Continued on page 202*

Fig. 2. Closeup showing Yoder seam welder and Carboloy grade 370 carbide tool (directly behind small wheel, lower left) which removed a trouble spot in this miniature production line. Although the carbide tool, used to remove flash, "operates" in a hot zone near the welding spot, it trims over 12,500' of tubing daily before regrinding is necessary.

PRECISION-PREPARED

TOOL STEEL FLATS AND SQUARES

for tools...dies...precision parts

Warplis

OIL HARDENING

GROUND FLAT STOCK

Carbon	.90%	Manganese	1.10%
Chromium	.50%	Tungsten	.50%
		Vanadium	.15%

Generally regarded as the finest of its type . . . the most versatile and adaptable for the widest range of purposes.

"Pittsburgh"

AIR HARDENING

GROUND FLAT STOCK

Carbon	1.00%	Manganese	.50%
Chromium	5.25%	Molybdenum	1.10%
		Vanadium	.25%

5% chrome type . . . offers superior toughness and wearability for long-run or out-of-the-ordinary applications.

Also precision-prepared oil hardening, water hardening and high speed drill rod rounds . . . water hardening flats and squares . . . cold finished fine steels in all sizes, grades and shapes.

These analyses, familiar to users of fine steel everywhere, have long been favoured for ease of working . . . for excellent hardness and toughness without appreciable warpage or dimensional change . . . for dependable performance.

What promotes the steel to still higher esteem is precision preparation by **improved** grinding techniques, ensuring smooth, flawless, decarb-free surface . . . close accuracy . . . truly square corners . . . flat and paraltel sides.

With fine steel thus prepared none of the time and talent of the skilled worker need be spent on get-ready—no metal wasted. Procedures may be simplified . . . quality controlled . . . work speeded . . . time and money saved.

Warplis oil hardening comes in the complete range of 651 standard sizes; "Pittsburgh" air hardening in 168 standard sizes within the more limited range for which this grade is best adapted.

Each precision-prepared piece is indelibly name-branded . . . each comes in its own protective wrapper bearing size, brand, analysis, and easy-to-follow hardening instructions.

The size and grade of your choice is conveniently obtainable from selected distributors coast-to-coast. Order by name . . . or ask us for complete information.

PITTSBURGH TOOL STEEL WIRE CO.

MONACA, PENNA.

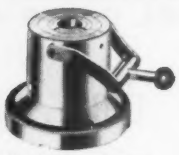
•

CIRCLE INFORM-A-GRAM KEY NO. 991

Zagar Tools

HOLD YOUR WORK—AND YOUR BUSINESS!

Collet indexing fixture



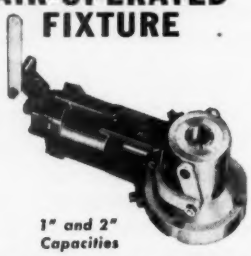
Collet holding fixture

Vertical-horizontal collet fixture

ZAGAR HOLDING and INDEXING FIXTURES

Zagar fixtures offer you a most inexpensive way to machine small parts. Set-up is speeded and much special tooling eliminated. Slot milling, straddle milling, drilling, tapping and grinding of small pieces can be done most profitably with Zagar fixtures, *available from stock.*

AIR-OPERATED FIXTURE



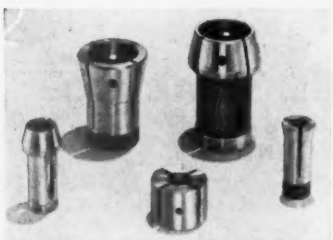
1" and 2" Capacities

Manual or mechanical control is optional on the "Air-O." The cam or chain can be readily connected. Solenoid operation is possible for the valve control. Parts are interchangeable. Far out-speeds hand operation.

COLLET LATHE CHUCKS

1" and 2" Capacities

Zagar chucks are easily adapted to any make of lathe, grinder or rotating spindle. Handles bar stock—lengthwise, with no movement. Speeds loading and unloading. Can be opened and closed while machine is running.



COLLETS, PADS, BLANKS

Five types: No. 310 Zagar Master; Nos. 2 and 6 W. & S.; No. 5-C; No. 6 W. & S. pads. All but Zagar No. 310 are standard machine tool sizes. All collets are made of oil-hardened tool steel; have flat tops for locating purposes.

Write for Engineering Sheets' 'T-2" on each product.

ZAGAR TOOL, INC.

24000 LAKELAND BLVD.

CLEVELAND 23, OHIO

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

CIRCLE INFORM-A-GRAM KEY NO. 1001

YOUTH SUPERVISION BOOKLET VALUABLE TRAINING AID

"The Youth You Supervise," a 13-page Labor Department bulletin directed to on-the-job supervisors of young workers, should be particularly helpful to employers in firms where there is no formal training for supervisors but where many young people get their first jobs.

The first part of the bulletin tells what young people are like and why; the second part gives pointers on how to help them become a responsible part of the work force. Suggestions on how supervisors can ease the transition from school to job, teach their young workers good work habits and attitudes, reduce turnover, and cut the time it takes these workers to develop into well-adjusted employees, are important features of the booklet.

Single copies of "The Youth You Supervise" are available without charge from the Bureau of Labor Standards, U. S. Department of Labor, Washington 25, D. C. Quantities can be obtained from the U. S. Government Printing Office in Washington for 10 cents a copy or $7.50 a hundred.

CARBIDE TIPS UP BROACH LIFE

Shifting to cemented carbide-tipped broaches not only increased bearing cap broach life at Studebaker Corp., South Bend, Ind., by 2500%, but also reduced over-all costs drastically. Studebaker engineers say the change cut over-all costs—tooling, downtime, labor, etc. — approximately 22% on the first run.

Broaching the automobile bearing caps is unusually tough on tools, because of the work material, a highly abrasive cast iron with a sandy surface condition. Conventional broaches do not have high enough abrasion resistance.

Work is done on a Cincinnati vertical broaching machine with two rams. Speed is 28 sfpm, chip load per tooth 0.005" for roughing and 0.0015" for finishing.

. . . *Continued on page 102*

PORTAGE

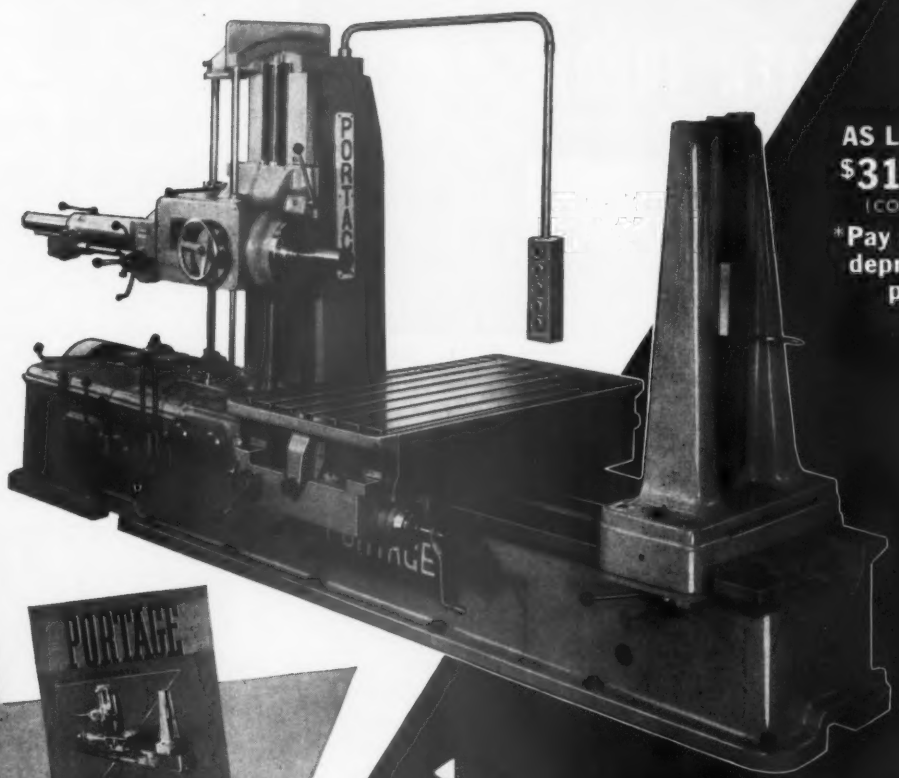
(4" Diameter Spindle)

Horizontal Boring, Drilling & Milling Machine

Outstanding . . .

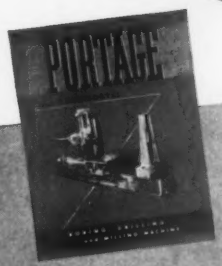
MACHINE OF THE YEAR

Unsurpassed in Price and Quality



AS LOW AS $31,358 (COMPLETE)

*Pay as you depreciate plan



Write for Catalog today!

The PORTAGE Boring, Drilling & Milling Machine offers a *real* saving in new machine investment. PORTAGE mills cost from 5% to 20% *LESS* than present comparable makes . . . and the amazing part of this savings is the machine itself . . . Write today for literature covering all the specifications and features on the PORTAGE Mill.

* For full particulars, phone the factory today!

THE PORTAGE MACHINE CO.

1046 Sweitzer Avenue • Akron 11, Ohio

Representatives in Principal Cities

BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916

CIRCLE INFORM-A-GRAM KEY NO. 1011

BURGMASTER* TURRET DRILLS

with POWER INDEXING

"Without the BURGMASTERS our costs to produce this part would have been almost prohibitive"

BURGMASTERS cut costs on drilling, tapping, threading, counterboring, countersinking, grooving, spot facing, form tooling, hollow milling, etc.

REPORT FROM:

AMPEX CORPORATION

REDWOOD CITY, CALIF.

ROLF J. GRUENSTEIN, Sup't. of Fabrication

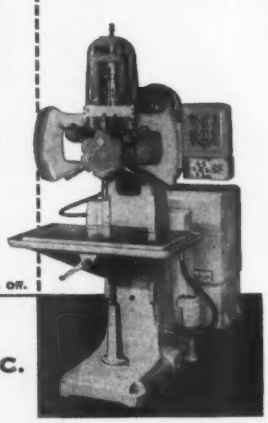
In the fabrication of Ampex CinemaScope Sound Systems used in theaters all over the world, one casting requires 42 separate drilling, tapping, reaming or counterboring operations. This includes drilling holes from #57 (.043 inches) to ¾ of an inch, and reaming holes to ½ inch with extremely critical dimensions on size and alignment. Without the BURGMASTERS our costs to produce this part would have been almost prohibitive. Other equipment to fill the same need would have been much more expensive and much less versatile for our type production.

We have found the following qualities of the BURGMASTER to be of definite advantage in the manufacture of Ampex CinemaScope Sound Systems and Ampex Magnetic Tape Recorders. High precision. Wide range of preselected speeds. Large adjustable work table. Low maintenance cost. Minimum time and effort required for set-up.

Visit our booth 516, March 14 - 18, ASTE Western Exposition, Los Angeles, for preview of unique new metal working tools.

AVAILABLE IN:
- **Six spindle manual**
- **Six spindle, hydraulic, automatic**
- **Eight spindle, hydraulic, automatic**

Automatic hydraulic BURGMASTERS feature skip indexing, automatic cycling and infinitely variable preselective feeds. All BURGMASTER machines feature power indexing, pre-selective spindle speeds, very close pre-selective depth control.



WRITE FOR BULLETIN NO. TP2

*T.M. Reg. U.S. Pat. Off.

BURG TOOL

MANUFACTURING COMPANY INC.

P.O. BOX 48, GARDENA, CALIF.

CIRCLE INFORM-A-GRAM KEY NO. 1021

. . . Carbide Tips, from page 100

Special round, push type 3-section broaches are employed on the standard machine setup. Each broach section has 12 teeth, and in operation only half the diameter contacts the part; thus, 2 settings of the broach are made before removing for resharpening.

The conventional broach previously used operated a maximum of 24 hrs, and sometimes failed completely after 1½ hrs. Maximum production was 3600 pcs. After tipping with Carboloy grade 883 cemented carbide, the initial broach ran 50 days in continuous production on a 12-hr operating cycle, producing 90,000 pcs on one setting without any service needed. Subsequent runs have consistently exceeded the initial performance.

CARBIDE-TOOLED DUPLEX MILLER BANS BOTTLENECK

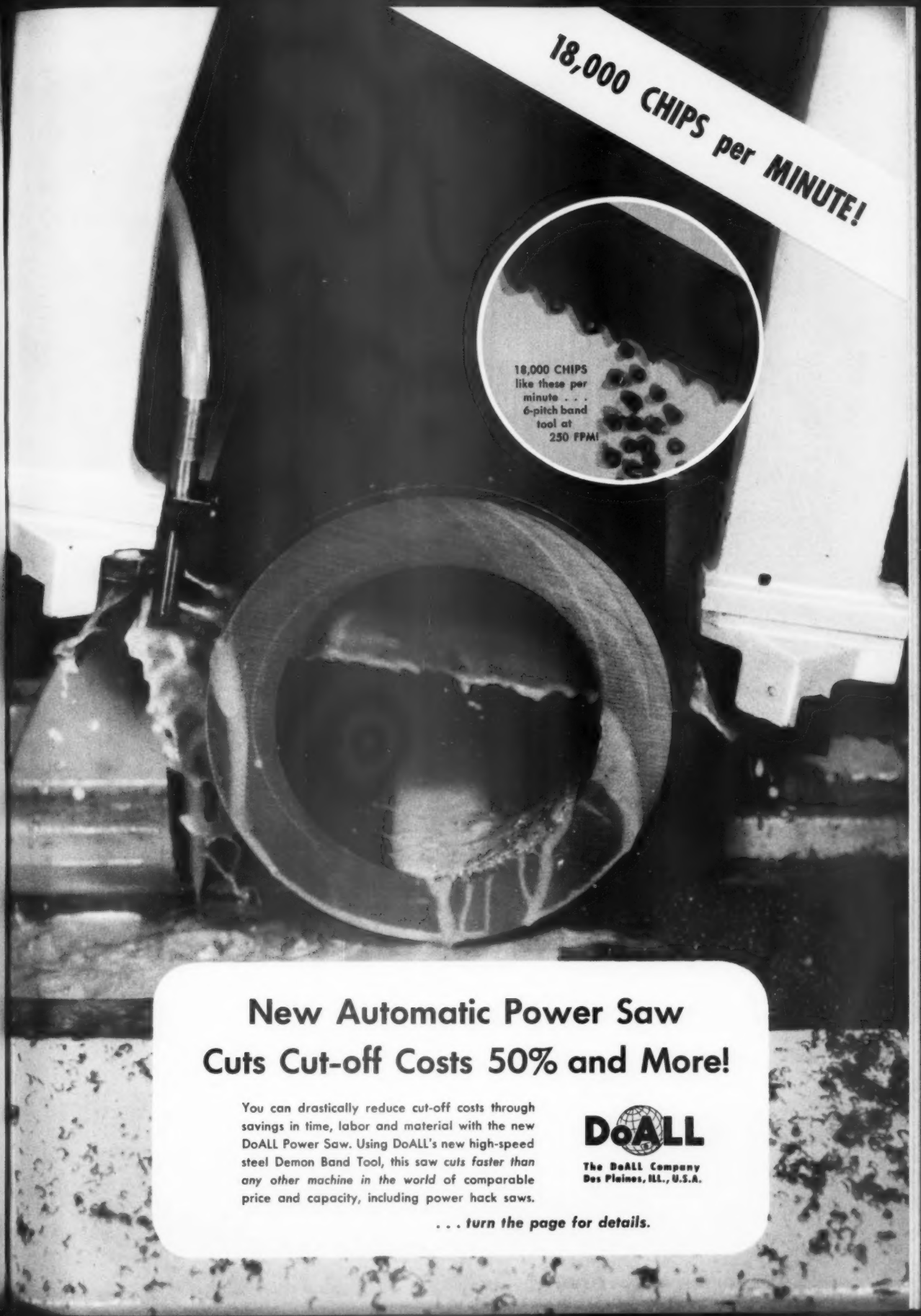
Elimination of a bottleneck in production of cold finished flats at the Jones & Laughlin Steel Corporation's Pittsburgh Works, has been attributed to the recent addition of a duplex milling machine equipped with carbide-tipped cutters.

The machine finishes in stacks the edges of wide cold-rolled flats, machining along both sides of the

stack simultaneously. Flats to be processed range in size from 3/16" to 2½" thick, and from 6" to 14⅞" wide, and up to 12' long. The cold-rolled steel flats are widely used in construction of jigs, fixtures, dies, molds and special machining.

The flats are aligned by a hydraulic work positioning device and held securely by special hydraulically-operated clamps during the milling operation.

The 15" dia. carbide-tipped cutters operate at speeds up to 450 sfpm. Table speed for milling medium carbon steel is 32 ipm on roughing, and about 17½ ipm on finishing.



New Automatic Power Saw Cuts Cut-off Costs 50% and More!

You can drastically reduce cut-off costs through savings in time, labor and material with the new DoALL Power Saw. Using DoALL's new high-speed steel Demon Band Tool, this saw *cuts faster than any other machine in the world* of comparable price and capacity, including power hack saws.

DoALL

The DoALL Company
Des Plaines, Ill., U.S.A.

. . . turn the page for details.

NEW
MACHINING TEAM

DoALL Power Saw . . . Outperforms All Others!

★CUTS FASTER—cuts 25% to more than 50% faster than power hack saws of comparable capacity and price . . . pays off fast in labor savings and higher output per machine.

★SAVES MATERIAL—just compare the 1/16" kerf cut by the thin, continuous cutting DoALL band tool with the 1/8" kerf of hack saw blades or 1/4" cut of a cold saw . . . you save 1/2" or more of costly stock every 8 cuts!

★LOW TOOL COST—the new DoALL Demon High-Speed Steel band tool lasts up to 10 times longer than previous carbon steel saw bands . . . you get tremendous output per dollar of tool cost!

★CAPACITY UP to 12" rounds, 12" x 12" flats.

You can put a terrific cutting load on a Demon Blade—*a continuous band of high-speed steel.* It retains its hardness up to 1100°F compared to only 350° for carbon steel blades. Available in Precision and Buttress type . . . in welded bands to fit the DoALL Power Saw . . . 1" wide . . . 2 to 10 pitch depending on material to be sawed.

Demon Precision HIGH-SPEED STEEL

Demon Buttress HIGH-SPEED STEEL

THE new DoALL Power Saw and DoALL Demon high-speed steel band tool is the most productive cut-off team ever developed. *Continuous* high-speed cutting . . . stock-saving narrow kerf . . . great accuracy . . . straight cuts . . . good finish . . . automatic operation . . . minimum floor space . . . hydraulic controls . . . easy operation . . . low maintenance—all these and more cost-reducing benefits accrue to its users.

FULL AUTOMATIC or MANUAL FEED—models available with fully automatic feeding, indexing and sawing for high volume production, or with manual feed when desired.

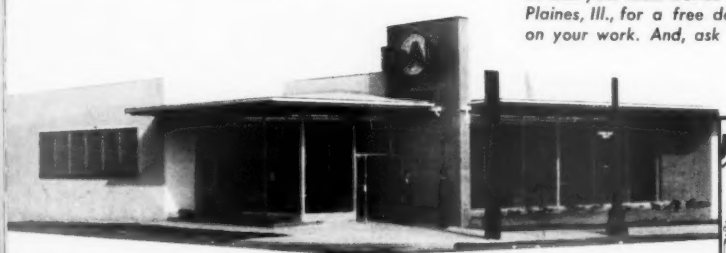
VARIABLE SPEED—90 to 350 FPM for greatest sawing versatility and efficiency. Step or single speed drives optional.

CONSTANT BAND TENSION AND FEED PRESSURE, automatically maintained for optimum sawing efficiency.

To cut your cut-off costs, get the facts . . . then judge for yourself!

DoALL

FREE DEMONSTRATION. *You can see it and believe it! Call your local DoALL Store or write DoALL, Des Plaines, Ill., for a free demonstration at your plant on your work. And, ask for new Catalog.*



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$1.00 each postpaid
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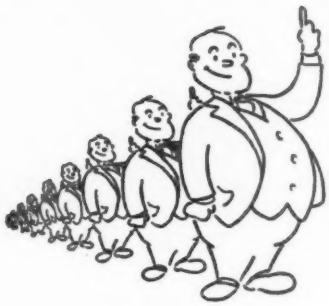
Friendly DoALL Stores . . . (in 40 cities)

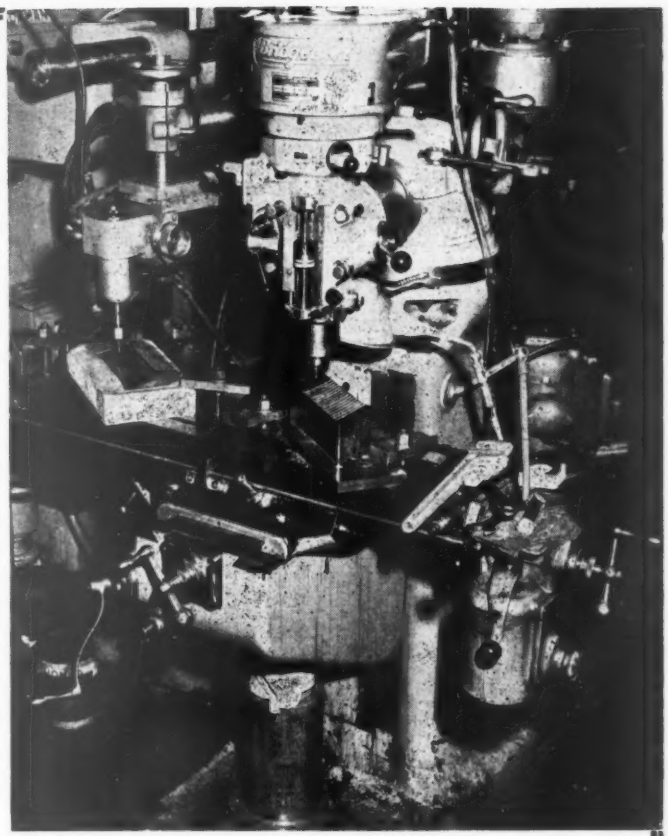
Personalized Service . . . Complete Stocks . . . Local Delivery

TRACER CONTROLLED MACHINING

Applied To The Bridgeport Vertical Mill



Mr. Duplicator



MR. DUPLICATOR SAYS: "Walker, we note with interest the continued demand for Bridgeports. There should be quite a demand for your Duplicators on these mills due to the important part that they play in the making of small dies.

WALKER SAYS: Mr. Duplicator, you are right. We sell many Walker Duplicators to go on the Bridgeport Vertical Turret Mill. As you know this is a very fine machine tool. At present it is second to none in its class and with the addition of the Walker Hydraulic Duplicator it plays an important part in tool and die manufacture. Our Knee Action Duplicator controls the up and down movement of the table assembly and the unique feature of this Duplicator is that it requires no disengaging. Another important point is due to the design of the tracer arm; as its versatility increases the capacity of the Bridgeport so much, that a job two or three times the normal table feed of the mill can be done. We would like to go into greater detail of this feature but space does not permit.

We build in our Knee Action Duplicator accuracy so great that our customers just won't believe it. This is true of all our Duplicators and this ability has been developed by our approximately 25 years of building Hydraulic Duplicators. We say without hesitation that when you buy Walker Hydraulic Duplicators, you have bought the best. Small jobs are being done much faster with this type Duplicator than can be done on special expensive machines costing two and three times more. We have representation in principal industrial areas and without a doubt our representative can show you one of our Duplicators in action close by.

We not only build Duplicators for small milling machines, but we build for the largest of mills both vertical and horizontal. The writer is the originator of the Hydraulic Duplicating Attachment for machine tools and has built Hydraulic Duplicators for practically every type of machine tool, such as: lathes, planers, shapers, grinders, and special machine tools.

An important announcement regarding true automatic tracing is just about ready to be released. This is truly automatic in its entirety. We will be glad to work with you on any of your duplicating problems. We have the answers and our prices are right. Contact us now by letter or phone! Call Standish 7871.

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Pioneer Designers and Builders of Precision Duplicating Equipment

CIRCLE INFORM-A-GRAM KEY NO. 1031

YOU can hold a SPEED record too-

NEW MILE RECORD
Aug. 7, 1954 - 3:58.8

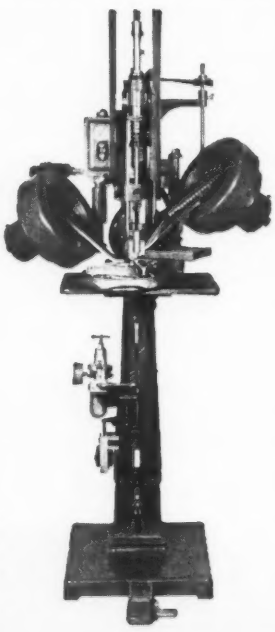
Performance that will far out-distance obsolete hand methods in your ASSEMBLY DEPARTMENT!

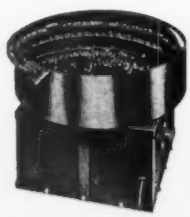
DPS POWER SCREWDRIVERS and SELECTIVE PARTS FEEDERS

are the answer!

● While these champions may be tops in their field, DPS Assembling Equipment is a leading factor in the American Industrial Field—And not only in the matter of speed, (with a record of driving screws at one per second) but in economy effected through labor-saving and greater accuracy through the elimination of manual handling.

Whatever your Feeding and Assembling Operations may be, write us . . . Also send sample assembly for production estimate.





DPS BOWL-FEEDERS

● Designed to feed light, fragile parts that might not withstand tumbling. Operates on the VIBRATORY PRINCIPLE . . . Provides fully automatic, oriented, single line feeding to Grinding, Packaging, Inspecting and many other automatic machines and operations.

DETROIT POWER SCREWDRIVER CO.

2827 W. FORT ST. DETROIT 16, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1041

Fast Multi-Track Feeders Expand Automation Field

Nearly a half million parts per hour are fed with the battery of PEECO feeders shown here. Fourteen multi-track feeders operating independently (but at the same speed) feed parts 3/16" in diameter and 1" long in single line tubes at this terrific rate of speed. The operating flow speed from each track is 140 pcs/min.

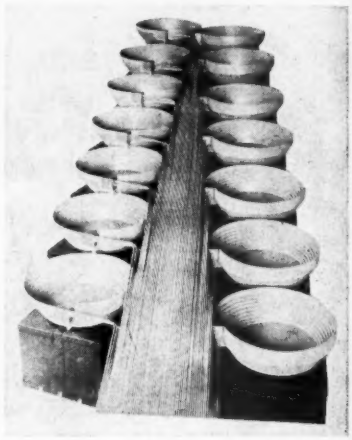


Photo courtesy Perry Equipment & Eng'g. Co.

Multi-track feeders permit automation techniques to be applied to a wider variety of production jobs. Each small parts feeding problem must be approached anew from an engineering standpoint, and cast feeder bowls specially designed for each specific application. No matter how small the parts or how fragile, they may be safely handled at a predetermined speed by PEECO feeders.

It's Movie Time . . .

"Die Casting — How else would you make it?", takes 35 minutes to describe die casting methods. Bookings are now being made by the American Zinc Institute, Inc., 60 E. 42 St., New York 17.

"Tooling Up For Profits," is a case history of the application of Thor electric tools to the assembly of oil burner units at the Armstrong Furnace Co. Contact Thor Power Tool Co., Aurora, Ill.

No. 8 in a Series

ACTUAL SIZE

when the odds don't have it...

Before putting the chips down it is well to realize that reliable machine performance is largely dependent on well balanced tooling. If it is a multiple spindle bar automatic, an even number of work spindles provides a better opportunity for balance than an odd number.

Odd or even, the work spindles are only one of many important considerations in the selection of an "automatic". Other factors also important to the individual machine user are suggested by the new Conomatic General Datalog. Copies are now available.

data for comparison

Part	Levelling Screw
Machine	1⅝" Six Conomatic
Tools	100% Carbide Tipped
Material	B-1112
Stock Size	1" Round
R. P. M.	Work Spindle — 958 Opposed Spindle — 677
Time	7.25 Seconds per Cycle 3.6 Seconds per Piece

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1051

Brinell Testing

→ at production line speeds! →

This direct reading Brinell hardness tester tests round or flat parts *fast*. No grinding of parts is necessary and the operator simply notes that the dial indicator needle falls between pre-set tolerance hands.

Hydraulically applied standard Brinell test loads are used. Foot control allows operator to test parts as quickly as he can move them through the machine.

Write for more information on all our Brinell testing machines.

DETROIT TESTING MACHINE COMPANY

9386 *Grinnell Ave., Detroit 13, Mich.*

CIRCLE INFORM-A-GRAM KEY NO. 1061

BRAND NEW

ANGULAR-BASE **TOGGLE CLAMP**

DE-STA-CO

with low silhouette the fixture-hugger that makes it far easier to insert and remove work . . .

and complete clearance of working area due to flop-over holding bar—ideal for positioning metal or plastic sheets!

Send for FREE CATALOG on the new DE-STA-CO Models 507 and 509

DE-STA-CO DETROIT STAMPING COMPANY

World's **FIRST** Line of **TOGGLE CLAMPS**

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CIRCLE INFORM-A-GRAM KEY NO. 1062

Attain — Real TOOLROOM Efficiency *with* OLIVER DIE MAKING MACHINES

BE WISE OLIVERIZE

Speedy, efficient and accurate are OLIVER DIE MAKING MACHINES... proved in more than 10,000 installations throughout the world. They are consistently effecting cost reductions of as much as 60% by simplifying sawing, filing and lapping operations. Because they save time and do not require expensive skilled labor, OLIVERS have been in constant use in many plants for more than 25 years.

Engineered, designed and built by OLIVER of Adrian these die makers have proved themselves unsurpassed for accuracy. Proved invaluable on Production Filing, Experimental Work, Metal Patterns, Cams, Gages and Templates, OLIVERS have been serving industry for almost 40 years. Cut down your die making costs . . . increase your output . . . saw, file and lap with OLIVER DIE MAKING MACHINES.

OLIVER DIE MAKERS Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write Today For Complete Technical Data on **OLIVER DIE MAKERS**

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MACHINE TOOLS by OLIVER include:

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

OLIVER INSTRUMENT CO.

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CIRCLE INFORM-A-GRAM KEY NO. 1063

Special Machines Built From Standard Units

The advantage in using standard components to build special purpose machines lies in the fact that the components can be removed and re-used with new tooling. This advantage is in addition to the original purpose for which the machine was designed.

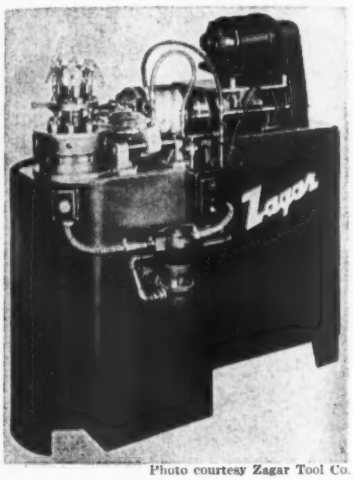


Photo courtesy Zagar Tool Co.

The machine illustrated is one of a series of special purpose drilling machines in which a standard hydraulic feed unit and a standard gearless drill head are used. These machines are built to standards set by J. I. C.

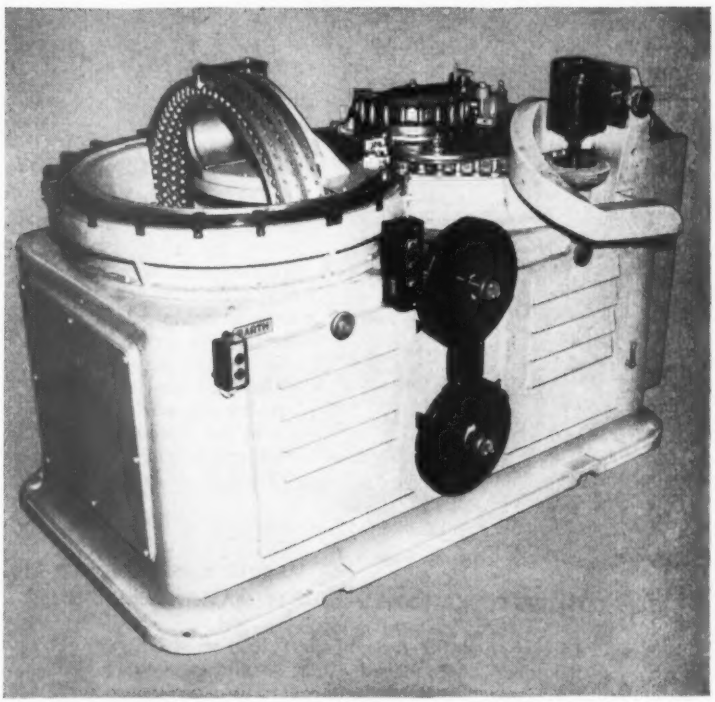
The feed unit includes a base which serves as a table for the manually operated six-station indexing fixture. While three stations are at drilling position, the remaining three are open for loading and unloading.

Magnetic Sheet Separators Cut Handling Costs

Use of magnetic-type sheet steel separators in the punch press department of Cutler-Hammer, Inc. has resulted in significant savings in labor costs and almost complete elimination of injuries from one phase of the firm's operations.

Cutler-Hammer reports that, since installation of the separators in its New York plant last

. . . *Continued on page 114*



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SPECIAL MACHINE

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CIRCLE INFORM-A-GRAM KEY NO. 1071

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UNSURPASSED FOR EVERY PRODUCTION MARKING APPLICATION

AFFORD FASTER, BETTER, MORE ECONOMICAL MARKING OF ANY LEGEND . . . ON ANY MATERIAL . . . AND EVERY CONTOUR!

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Parker Marking Machines are unmatched for versatility—stamp lettering, trademarks, graduations, knurling in limitless varieties on flat, irregular or curved surfaces of different diameters. Each impression is clean and sharp—indelibly stamped to uniform depth—in far less time, to far greater precision than the finest hand marking.

PARKER CAN PRODUCE A TOOL TO SPECIFICATIONS FOR ANY MARKING MACHINE!

Interchangeable type holders . . . roll dies . . . flat dies . . . engraved knurls—whatever your requirements, Parker engineers and craftsmen can produce a marking tool to your specifications to fit any marking machine.

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Send today for literature on the Parker 650 Marking Machine.

THE PARKER STAMP WORKS, INC. by Parker
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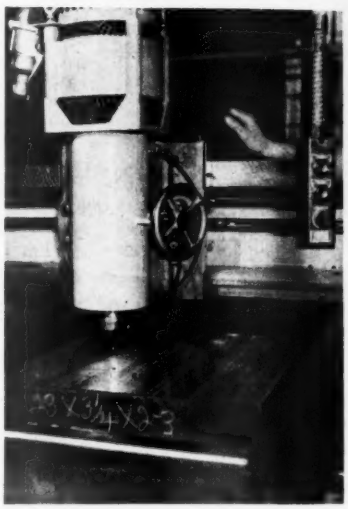
CIRCLE INFORM-A-GRAM KEY NO. 1081

SPINDLE CONVERTS OLD MACHINE FOR CARBIDE MILLING

A unique motorized spindle for converting planers and old milling machines for high speed carbide milling is being offered by the Detroit Milling Cutter Co. for use with their indexable carbide milling cutters.

The milling spindle, driven by a 20 hp, 1200 rpm, glass wound, fan cooled motor, is connected directly to the rotor of the motor, eliminating all gears and gear backlash, which contributes to carbide tool breakdown. Vertical



adjustment is by ways rather than a spline for the same reason.

A choice of four table feeds ranging from 30″ to 120″ per min is available to the operator and a "Loadmeter" shuts off the feed motors if the spindle is seriously overloaded.

A standard 4″ Futurmill cutter having eight octagonal solid carbide blades is being used in the accompanying illustration to machine a 23″ by 23″ mild steel block to a depth of ⅛″ with seven cuts at 60″ per min. Machining time is reduced from hours to minutes as compared to a single point planer tool. The octagonal blades in the Futurmill cutter can be quickly indexed when dull to set up a new cutting edge.

Contact The Detroit Milling Cutter Co., 28625 Grand River, Farmington, Mich., for further information, or—**Circle Inform-A-Gram Key No. D4.**

NEW *Grip-Tip* CENTERS

CHECK THESE *Grip-Tip* FEATURES

- Long-Life Holders
- Replaceable Carbide Tips
- Easy Insertion and Removal of Male or Female Tips
- Reduced Machine Down-Time
- Lower Cost for Replacement of Carbide Tips
- Carbide Tips Accurate to .0005"
- No Regrinding of Holder
- Carbide Tips Are Easy and Inexpensive to Stock
- Reduced Regrinding Time
- Longer Diamond Wheel Life

with

REPLACEABLE CARBIDE TIPS

Grip-Tip Centers are specifically designed to substantially reduce your replacement costs and machine down-time for regrinding or replacement of worn or chipped centers.

Male or female carbide tips are inserted or removed from the tool steel holders by simply turning a screw. The unique clamping action of holders on tips is positive and quick . . . you save replacement time with Grip-Tip Centers.

The life of Grip-Tip holders is practically unlimited, for, only the dull or chipped carbide tips are reground. Because the steel holder is not ground when sharpening the carbide tip there is less clogging and longer life for your diamond wheels. Also, the relatively inexpensive double end tips in both male and female types can be stocked with a minimum investment . . . Grip-Tip Centers reduce tool and inventory costs.

Grip-Tip Centers increase your production by permitting full utilization of machine tools. It takes but a minute to remove old carbide tip and replace with a new one . . . machine down-time is less with Grip-Tip Centers.

For Further Information, Write to:

DETROIT REAMER & TOOL CO.

2830 EAST SEVEN MILE ROAD • DETROIT 34, MICHIGAN

D R & T COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 1091

When New Molds Stick use IMS SILICONE FLUID

For Better Tool and Die Lubrication!

Shorten costly break-in periods! Simply spray on this perfect parting agent from self-dispensing aerosol! Useful too in PATTERN MAKING — releases patterns from master molds with minimum surface defects. Remember . . .

WHERE ANYTHING STICKS
it always pays to try
IMS SILICONE SPRAY

Get new tools into production sooner. Keep a few cans handy all the time. Order today!

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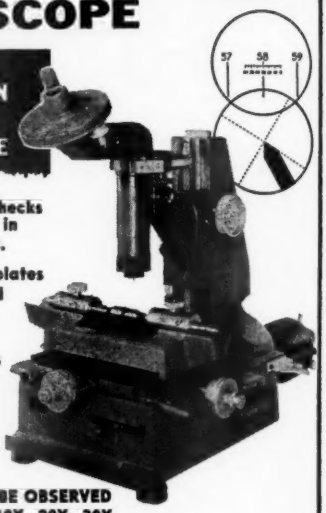
CIRCLE INFORM-A-GRAM KEY NO. 1101

NEW LEITZ TOOLMAKER MICROSCOPE

...PRODUCES HIGHEST PRECISION
....CUTS INSPECTION TIME



The NEW LEITZ DESIGN checks angular measurements in degrees and minutes.

Contains all Thread Templates for U. S. National thread profiles 6-80 pitch.

Contains Radii Templates from 21/64" to 13/16" by 1/64". Concentric circles from .010" to .280" by .010" and one blank compartment.

NOTE: TEMPLATES CAN BE OBSERVED IN 3 MAGNIFICATIONS: 10X - 20X - 30X

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CIRCLE INFORM-A-GRAM KEY NO. 1102

PROCUNIER TAPPERS HAVE . . .

"LONGER LIFE BUILT IN!"

Leading industrial manufacturers now using Procunier Tapping equipment are amazed at the "productive life" of these sensitive high speed tappers. Precision made for precision work, they've been "taking it" and producing under most extreme production conditions with phenomenal results. Users report "less down time"; "higher quality parts"; "drastic reduction in tap breakage and parts spoilage"; "more speed"; "a rugged dependability". There's one obvious conclusion: "Procunier heads are better, more productive and unquestionably have "longer life built in".

Procunier heads have many exclusive features: They provide a smooth "controlled tapping" action thru a unique clutch design—operating with a sensitive "cushioned action" that saves taps, improves work quality and enables "new" help to operate them like "seasoned experts". Get the full story of Procunier tappers and learn how industry is using them to increase production, reduce parts and tap spoilage and produce higher quality work for less—faster!

New Exclusive "Tru-Grip" Tap Holder
smaller, lighter, more accurate, taps close to walls.

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CIRCLE INFORM-A-GRAM KEY NO. 1104

INVESTMENT-CASTING CUTS CAM COST 86%

Reduced production costs, amounting to approximately 86%, have been realized by the Stratos Division, Fairchild Engine & Airplane Corporation, in the production of a cam used in an aircraft air conditioning system valve. Originally the cam was formed from a two-piece assembly. Its main segment was of 4140 steel turned from bar stock and hardened to 50 Rc. Its hub was of hard brass turned from bar stock and broached. To complete the assembly, the two pieces were riveted.

A high percentage of the costs involved in the production of this part came from the required machining operations plus the assembly of the two pieces. To eliminate these operations, the valve cam is now produced for Stratos by National Precision Casting Corporation, by the investment casting process. The part is cast in one piece including the hub, in 4140 steel; the cam area surface is hardened to 50 Rc.

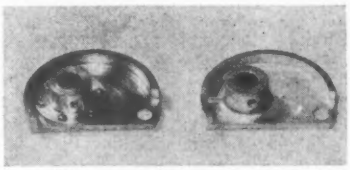


Photo courtesy Investment Casting Institute

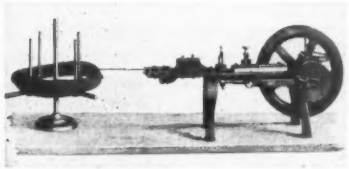
Stratos has now been able to eliminate both the previously required shaping operations and in addition, the riveting operation. The reduction costs, directly traceable to these steps, has enabled the company to slash some 86% on the cost of this part.

—•—

VERSATILE CUTTER FOR SHORT LENGTHS OF WIRE

Short lengths of wire from one to 12" long and up to ⅛" in diameter are straightened and cut to size accurately and quickly by the Lewis No. 7 wire machine, manufactured by The Lewis Machine Co., 3441 E. 76 St., Cleveland 27.

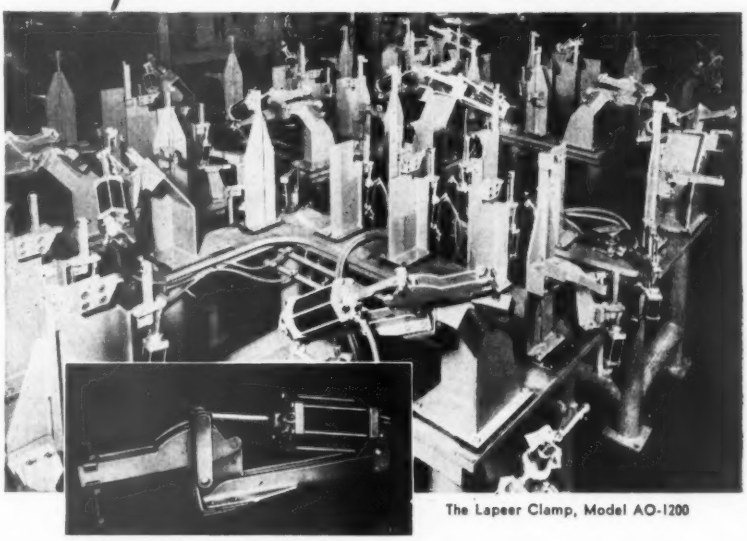
The Lewis No. 7 can be hand operated for producing of small quantities of wire, or belt or motor driven for increased production. A graduated scale simplifies adjustments to produce any desired length of wire.



The wire is fed through the machine by a reciprocating feed clutch and it is automatically straightened and cut to length. The wheel is adjustable to any size coil and wire is straightened by a 10-roll straightener. The cutting knife is operated by a cam on the flywheel shaft.

The practicality and durability of the Lewis No. 7 are proven by its extensive use in foundries for the preparation of core wire and in many other industries—**Circle Inform-A-Gram Key No. D6.**

Spot Welded **IN 60 SECONDS!**



The Lapeer Clamp, Model AO-1200

Truck cowl and plenum assemblies for a leading automotive manufacturer are placed into position, clamped, and spot welded in 60 seconds by one operator as a result of these fixtures engineered by the Martin Electric Co., Detroit.

Important to the production record of this installation is the air-operated, toggle-action clamp made by Lapeer . . . 7 on each fixture. Because they go into action so quickly, they save operator time and fatigue. Because they hold the work so rigidly, the manufacturer attains new horizons in quality control.

It's entirely possible that you have a work-holding problem that will be quickly solved by Lapeer. Better write for information—today.

And send for this free catalog.

4238

KNU-VISE PRODUCTS **LAPEER MANUFACTURING CO.**

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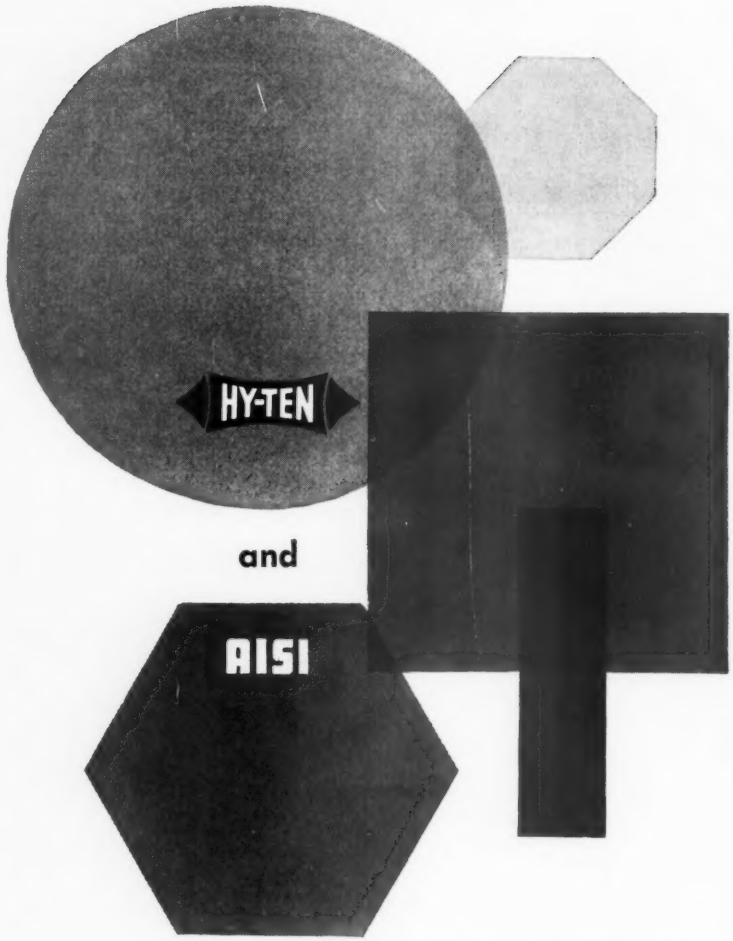
WESTERN DIVISION: 422 Magnolia, Glendale, California • CANADIAN DIVISION: Higginson Engr., Hamilton, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 1111



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CIRCLE INFORM-A-GRAM KEY NO. 1121

COMPREHENSIVE COATED ABRASIVE DIGEST PUBLISHED

A 60-page "Production Digest" of authoritative papers on coated abrasive grinding and polishing techniques has been published by the Behr-Manning Corporation to "help industry solve modern

grinding and polishing problems and suggest new and practical methods."

The extremely useful reference handbook is assembled from 20 technical papers prepared by Behr-Manning methods engineers during the past two years for 12 leading production engineering magazines, including TOOLING & PRODUCTION. To give uniformity to the publication the company has re-set the articles and 142 photographs, drawings, and tables, so the chapters are not precisely reprints.

Subjects covered in the digest include: coated abrasives theory and practices, contour polishing and grinding, the inside polishing of recesses and small openings, the conversion of polishing jacks to belt usage, part sizing and deburring, and special abrasive cloth shapes and their uses.

The current first edition of the "Production Digest" is the most complete assembly of information yet published on the techniques of grinding and polishing with coated abrasives and Behr-Manning plans to issue future editions as fresh material is published.

You can get a copy of "Production Digest" from Behr-Manning Corp., Troy, N. Y., or—**Circle Inform-A-Gram Key No. D5.**

MACHINE HIGH SPEED STEEL FORGINGS

Profitably... Automatically

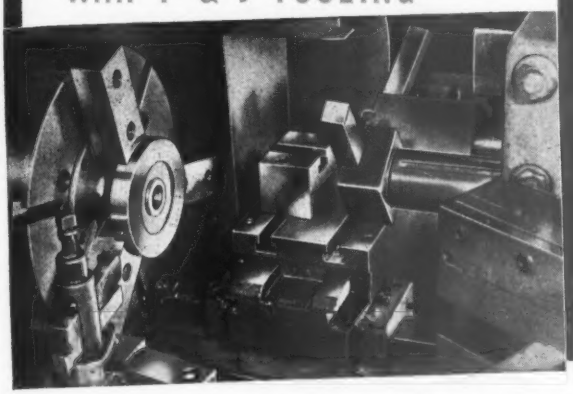
AN ACTUAL CASE HISTORY
involving:

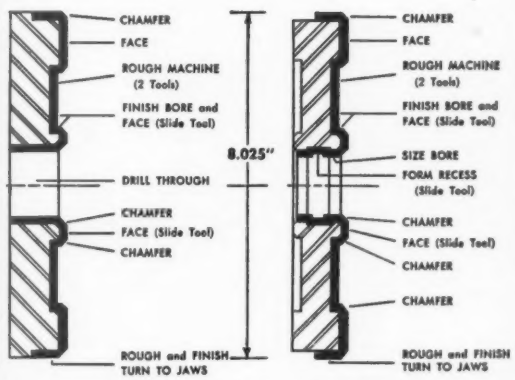
PART: 8" cutter blank, HSS forging

TIME: 9.69 minutes (floor-to-floor) for both operations

MACHINING: 24 separate rough and finish cuts, 11 in first operation, 13 in second operation

DONE ON A:
POTTER & JOHNSTON 4-U
WITH P & J TOOLING





HEAVY LINES INDICATE MACHINED SURFACES

The Potter & Johnston 4-U Automatic Turret Lathe is specifically designed and manufactured to give you the extra speed, power and rigidity needed to machine today's tough alloys faster, more economically. In addition, the 4-U is unusually versatile . . . combined with expert P&J Tooling, it offers new opportunities for increased profits on a wide variety of work types and sizes.

If your present equipment can't deliver performance like the job shown here, you owe it to yourself to learn more about the new 4-U Automatic.

SEND NOW FOR COMPLETE INFORMATION. Write direct or contact your nearest Pratt & Whitney Branch Office; ask for your copy of the 4-U Circular and the "34 Practical Production Ideas" Booklet — to help you increase output and reduce costs.

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AGENTS: DALLAS, THE STANCO CO.
HOUSTON, WESSENDORFF, NELMS & CO.

CIRCLE INFORM-A-GRAM KEY NO. 1131

. . . Magnetic Sheet, from page 107

year, a 5% savings on labor has been achieved. The company makes switchboxes and covers, using 16 and 18 gauge steel sheets of varying sizes. Prior to the introduction of the separators, wear and tear on the operators' gloves was considerable. . .and this is an additional cost that has been cut greatly.

The photo shows an operator first lifting a steel sheet before inserting it into the punch press. Action of the separator has raised the top sheet making lifting simple. As the operator inserts the first plate into the press, the next plate is already raised from its mates and ready to be lifted. Previously, a sharp metal instrument was used to separate the sheets. The result was wear and tear on gloves and numerous painful hand cuts among the workers. This has been eliminated by the magnetic separator, which also helps to prevent damage to polished or specially finished sheet surfaces.

Photo courtesy Basco Mfg. Co.

The separator induces a magnetic field among the stacked sheets causing them to tend to repel each other. Thus, the ends fan out leaving an air space between each two adjacent sheets. The separators are available in different models and sizes to suit the size of the steel sheet.

PRESS-RITE

RAISING THE CURTAIN ON THE NEW

45 TON POWER PRESS

A NEW MODERN PRESS BUILT FOR TODAY'S REQUIREMENTS

★ BETTER PARTS
★ GREATER SPEED
★ FASTER SET-UPS
★ EASY ACCESSIBILITY
★ INCREASED DIE LIFE

THE ONLY 45 TON OPEN BACK INCLINABLE PRESS WITH BUILT-IN STEEL TIE RODS AND 4" DIAMETER CRANKSHAFT AT MAIN BEARINGS

THE PRESS-RITE 45

is a worthy addition to the famous PRESS-RITE line which includes 2, 10, 15, 20, 30, 45, 60 and 85 ton models . . . with mechanical or airflex friction clutch and brake.

The New 45 Press-Rite Power Press is exclusive among presses because of the many heavy duty design features engineered into it. Equipped with heavy Unicast frame and built-in steel tie rods, there is less deflection. This means longer runs between die grinds . . . increased die life . . . better parts . . . more production with fewer rejects. Greater shut height. Full Vee Gibs easily adjustable from both sides for perfect alignment. Automatic cam actuated brake. Cam operated single stroke safety brake. Anti-friction flywheel bearings.

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CIRCLE INFORM-A-GRAM KEY NO. 1141

Salvaging Worn Grinding Segments

Reclaiming worn grinding segments is now possible through the use of a new adhesive. It is no longer necessary to throw away 25-35% of the grinding stubs since they can be cemented to new stone segments and thereby be entirely used.

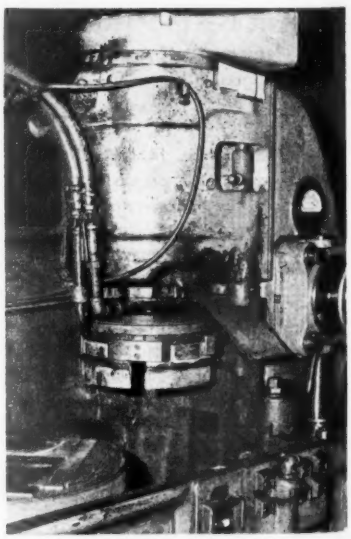

Photo courtesy Chemical Development Corp.

Reclaimed grinding segments in actual use.

The adhesive, Gaff Bond 334, is simply applied to the surface of the stone and the segments

clamped together with two "C" clamps for 48 hrs. They are then ready for reuse, no heat or pressure being required. The process can be continued indefinitely with no segment loss.

Tests extending over 1½ years show the cemented joint does not interfere in any way with grinding and that the strength of the cement is superior to the segment itself, thus ensuring the safety of the joint.

LATHE COMPOUND DOUBLES AS WHEEL DRESSER

Grinding wheels are dressed to any angle desired with accuracy and considerable speed at TEMCO Aircraft Corporation. The Dallas, Texas firm has adapted a Hardinge lathe compound to do the dressing. The compound can be mounted between the centers

on cylindrical and thread-grinders, or it can be used on surface grinders.

TEMCO'S thread-grinders have automatic provisions for dressing their grinding wheels to 15° or 30° angles. But any other degree of angle formerly had to be dressed by hand. This was time consuming and sometimes inaccurate.

Grinder operator Harold E. Hall devised the adjustable wheel dresser. He mounted the Hardinge compound — with attached degree marker — on a 4½" x 6½" block of ½" steel with a T-bolt slot. Then he drilled a center hole at each end of the block at 90° to the slot. Thus, when the compound is mounted between the centers in a grinder, the zero point on the degree marker is opposite the edge of the grinding wheel and perpendicular to its axis.

The diamond-holder on the Hardinge compound can be swiveled, lined up and locked at any one of the 360 degree marks on the degree-marker. Thus, if the compound is set 14° to the right of zero on the marker, for example, it will cut a precise 14° angle on the left side of the grinding wheel.

The diamond-holder has a lateral travel of ¾° in a dovetail slide. This travel governs the width of the cut made on a grinding wheel.

Wheels dressed with the Hardinge compound are accurate to 30 minutes. This precision, and the ability of the Hardinge compound to dress wheels to any angle, permit operators to do a variety of grinding jobs on their conventional machines.

Among these unique operations can be included the grinding of thread-grinder centers without "run-out"; draw broaches with 7° primary lands and 45° secondary lands; router collets with 10° angles; assemblies for various tooling jobs; and crush-dresser rolls used to dress wheels for manufacture of serrated aircraft parts.

CUT WIRE CUTTING COSTS

Completely enclosed straightener arbor guard
Higher speed fine-cut straightener wheel
Exceptionally rigid straightener arbor support brackets
Solenoid-operated trip mechanism (recommended for small diameter wire)
Heavy section V-belts with large pulleys
Modern flush mounted electric control buttons
Two wire size ranges — No. 2-C-3 — 1/16 to 3/16 inch No. 2-C-4 — 3/32 to 1/4 inch

with LEWIS 2-C wire straightening and cutting machines

Only **LEWIS 2-C-3** and **2-C-4** wire straightening and cutting machines have **all** of these features for fast, accurate and economical production. Their practical design and sturdy construction, reflecting more than 40 years' experience in manufacturing wire machines for **every** production requirement, assure uninterrupted service and maximum production at minimum cost. Write, wire or call today for additional information on LEWIS 2-C wire straightening and cutting machines.

Literature is available on the COMPLETE Lewis line of 23 machines for wire from .012" and stock to 3/4".

THE LEWIS MACHINE CO.

3450 EAST 76th STREET • CLEVELAND 27, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1151

HIGHER SPEEDS!
FASTER GRINDING!

kipp

AIR GRINDERS

Model JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.
212 Waubesa St. • Madison 10, Wis., U.S.A.
CIRCLE INFORM-A-GRAM KEY NO. 1161

NEW FREE CATALOG

FOR
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- Purchasing Agents
- Engineers
- Superintendents
- Managers

FREDDY FEDERAL will rush your copy today!

Costs, materials, and procedures graphically illustrated. New catalog tells where and how you can save money using Short Run Stampings. Also design tips to reduce stamping costs.

Write for your copy of catalog 201 today.

Federal TOOL AND MANUFACTURING CO.
3614 ALABAMA AVE. (ST. LOUIS PARK)
MINNEAPOLIS, MINNESOTA
"QUALITY STAMPINGS IN SMALL QUANTITIES"

CIRCLE INFORM-A-GRAM KEY NO. 1162

TOGGLE CADDY CLAMPS

ALL WELDED CONSTRUCTION
Outlasts stamped type clamps 5-1.

EXTRA LARGE PIVOT PINS
300% more bearing surface than other clamps.

HEAVIER FRAME
Cannot spring or bend under maximum load.

HEAVIER LINKS AND HANDLE
Pipe extension handle cannot damage clamp.

COMPLETE CATALOG ON REQUEST
ERICO PRODUCTS, INC.
2070 E. 61st PLACE • CLEVELAND 3, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1163

Tapping Troubles Corrected With Spray Lubricant

Excessive breakage and wear of taps at the O. K. Rubber, Inc. was such that an investigation was instituted to determine the cause.

On a typical tapping operation performed on a Carlton radial drill, four ⅜" taps were worn out while tapping 600 holes in 1⅛" thick alloy plate with the tap at a running speed of 265 rpm. Cooling and lubricating of the tap was done by the flood method using a water-soluble oil.

During the investigation a Norgren Spray-Lube System was installed on the radial drill. By means of a single nozzle, a spray of Dypral safety coolant, mixed 25 parts of water to 1 part of coolant, was directed at the tap and in the hole. The system works on an air line pressure of 60 psi, while the pressure on the liquid line is set at 62 psi.

A run was made with this spray-lube using a larger tap and working the same 1⅛" thick alloy steel plate. 300 ½" holes were tapped without changing the tap. After tapping the 300 holes, the tap showed only slightly perceptible signs of wear.

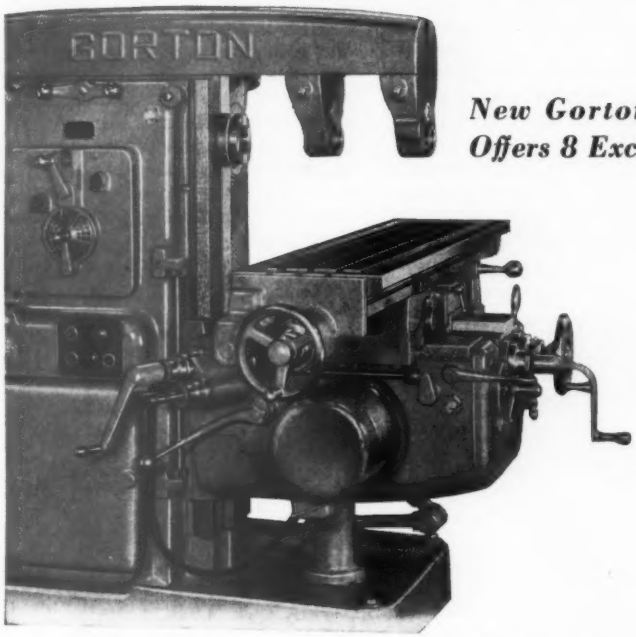
It should be noted that at the end of this test run the tap had already turned out twice as much work as the average of the four taps used previously and was still as good as new.

The speed of the tap was increased nearly 38% — from 265 to 365 rpm and the quality of the tapped hole was substantially improved.

Since permanently installing the Norgren Spray-Lube System, the saving over the flood system in machine cleaning time alone has paid for the spray system in its first month of use.

Descriptions of 775 U. S. Government-owned inventions in the field of instrumentation are contained in a booklet now available for $2 from the Office of Technical Services, United States Department of Commerce, Washington 25, D. C. The publication contains patent information on scientific and engineering instruments, mechanical measuring and controlling instruments, and optical instruments and lenses all available on royalty-free license basis.

New Concept in Milling



New Gorton Mill Offers 8 Exclusives

"First completely new design in years," say engineers who have seen demonstrations of the Gorton 2-28 Horizontal mill — a heavy-duty, high-speed-spindle machine suitable for carbide milling.

Square-lock bearings and a 24½-inch bearing spread on the knee provide extreme table rigidity. Even under heavy cutting loads, the table remains rigid. There can be no sag or twist.

The new Gorton Horizontals have, in addition to conventional spindle lubrication, a device that floods spindle bearings with 120 extra gallons of oil per hour. This method of cooling and lubricating dissipates spindle bearing heat throughout the column.

Net results are a marked reduction of spindle "growth" at the nose and, with only two driving gear contacts at any speed, more motor horsepower is usable at the spindle. This is a decided advantage over machines having more gears in contact and which do not dissipate spindle bearing heat as described.

A choice of three spindle speed ranges is available: 50 to 2000 rpm for carbide milling; 28 to 1100 rpm for conventional milling, or 25 to 2000 rpm for maximum work scope.

Double overload protection for cutters and gears stops all feeds when, for any reason, the cutter becomes overloaded or jammed. One is mechanical, the other electrical.

True unit construction drastically reduces down time and maintenance services. A removable coolant pan permits quick interchange of coolants and speeds sump clean-out.

A horsepower-load meter indicates cutter condition and records machine operating efficiency.

Complete information on the new, reasonably priced line of 2-28 Horizontals is available from the manufacturer. George Gorton Machine Co., 1202 Racine St., Racine, Wis., U.S.A.

Eight Gorton Exclusives Open New Era in Milling

1. **24½-inch knee**
2. **Oil-bath cooling of spindle bearings**
3. **Maximum horsepower at spindle nose**
4. **Spindle speeds from 25 to 2000 rpm**
5. **Double-overload protection for cutters**
6. **True unit construction**
7. **Removable coolant pan**
8. **Horsepower-load meter**

Motors available: 7½, 10 or 10/5 hp.

A 7789-2⅓

CIRCLE INFORM-A-GRAM KEY NO. 1171

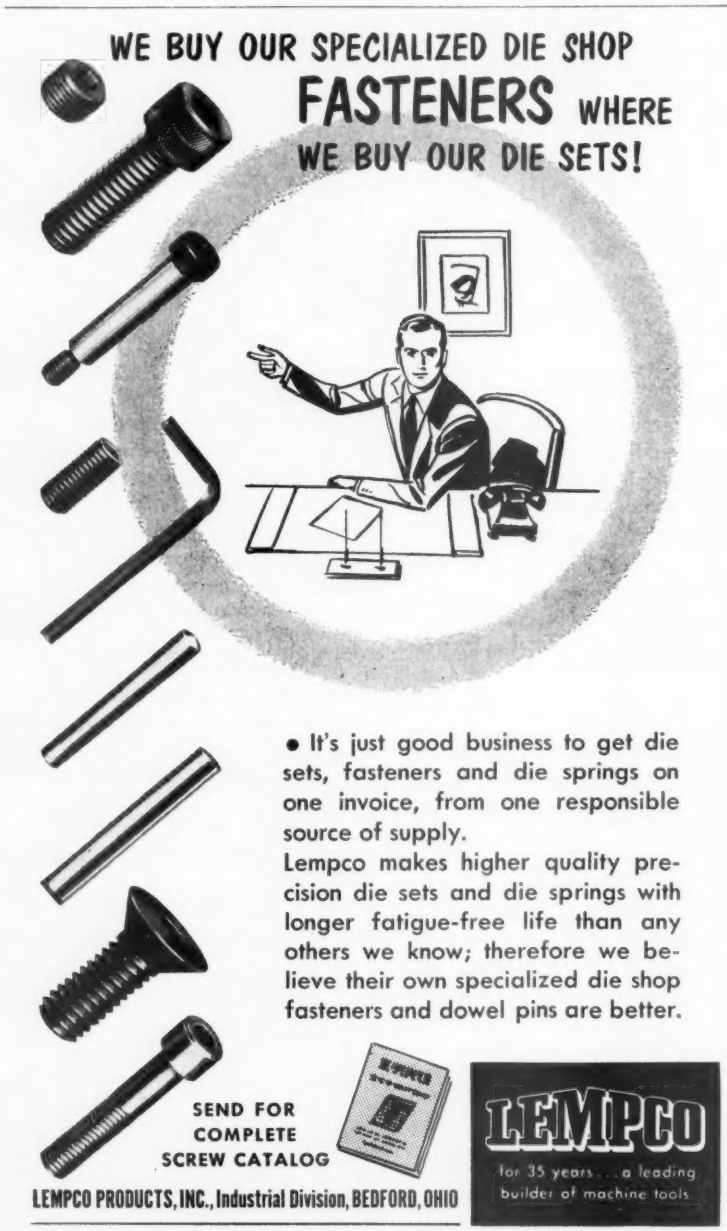
PORCENELL: NEW LOW COST SILICATE PROTECTIVE FINISH

The Porcenells, a new line of silicate or glass-like protective coatings which can be fused to any ferrous metal at moderate temperatures, are designed to provide permanent and decorative protection against rusting and corrosion . . . at costs comparable to galvanizing or synthetic resin paints. The new silicates can be applied by spray, brush or dipping and fired at temperatures from 900° F to 1200°F, depending upon the type of finish desired. In substance, Porcenell is similar to porcelain enamel, but is, according to the producer, more easily and less expensively applied primarily because of the low firing temperatures required. Surfaces suitable for Porcenell are reported to include sheet and plate as well as cast, wrought and malleable iron and high carbon steels.

Being inorganic in composition, the Porcenells are not subject to corrosion or organic change. As such, according to reports, they are ageless, fireproof, present strong scratch resistance, permanent color, and do not react to moisture or any corrosive agent normally found in the atmosphere.

Available in a variety of permanent colors and in textures ranging from full matte to high gloss, a single coat of Porcenell is said to offer sufficient protection for most types of protective or decorative service. Porcenell also serves as a corrosion proof base coat over which any paint can be applied.

Typical applications for Porcenell include: architectural, electrical, appliance and transportation industries. It is particularly adaptable to tanks and tubular products.


WE BUY OUR SPECIALIZED DIE SHOP
FASTENERS WHERE
WE BUY OUR DIE SETS!
• It's just good business to get die sets, fasteners and die springs on one invoice, from one responsible source of supply.
Lempco makes higher quality precision die sets and die springs with longer fatigue-free life than any others we know; therefore we believe their own specialized die shop fasteners and dowel pins are better.
SEND FOR COMPLETE SCREW CATALOG
LEMPCO PRODUCTS, INC., Industrial Division, BEDFORD, OHIO
LEMPCO
for 35 years . . . a leading builder of machine tools
CIRCLE INFORM-A-GRAM KEY NO. 1181

VERTICAL MACHINE FOR LARGE PARTS

Workpieces as large as 30" x 48", and weighing up to 5,000 lbs. can be easily bored, drilled, or vertical milled on a new machine — the Electromill. Many exclusive design features, plus unusually heavy and strong construction for a machine of this size, promise unusual precision, versatility, and speed.

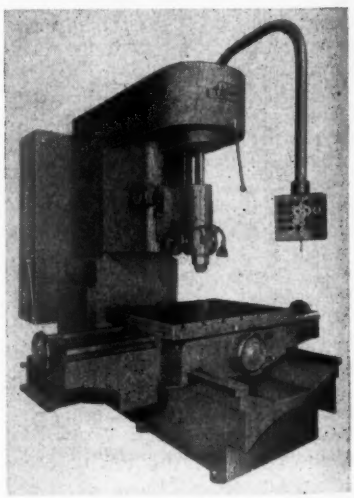


Photo courtesy W. B. Knight Mchy. Co.

All controls are located in a single panel that can be moved to the most convenient position

— front, back, or either side. Both the spindle speed and feed can be changed without stopping the spindle.

Non-gear, easily maintained direct drives give unusual smoothness of operation. Variable speed motors, equipped with "Thymotrol" control, offer a complete range of infinitely variable speeds and feeds.

The uniquely designed column and spindle head, and extra long quill, give the Electromill a full 35" of throat capacity. Large work can be completed with only one setting, permitting greater accuracy and increased production.

Air Motor Test Cart Checks Tools' Efficiency

This test cart is used for checking air motors periodically for efficiency and lubrication in the plant of Ryan Aeronautical Company, San Diego, California. By a systematic check at the points

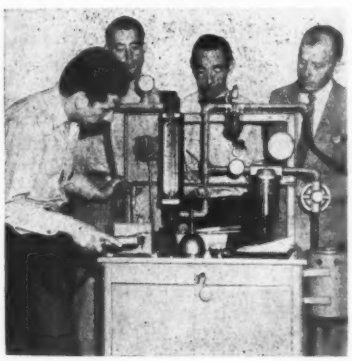


Photo courtesy Compressed Air and Gas Institute.

of use, higher productivity and longer life is obtained from pneumatic tools. Formerly, pneumatic tools were not overhauled until loss of efficiency was obvious.

Instruments on the cart include a tachometer, a flow meter, a filter and test gauge. Each motor is tested under actual load conditions. The cart was designed and built by Ryan plant engineers.

In addition to testing and lubricating, the cart also may be used for cleaning if tests being made indicate molybdenum sulfide can be used as a lubricant which would not be washed away by the cleaning solvent. If not, cleaning will continue to be done in the tool crib.

Throw-Away Carbide Inserts Eliminate Costly Regrinding

Boring, counterboring and facing malleable cast iron transfer case castings is now being performed more efficiently and economically at an Eastern ordnance plant since converting from a boring head with brazed-on carbide tips to one utilizing indexable square Kendex carbide "throw-away" buttons.

This operation is done at 0.022" feed, 375 sfpm, and ⅛" to ¼" depth of cut, on a radial drill press that is equipped with a special guide fixture in contact with bronze wear strips mounted in an arbor directly above the cutter body. The boring head's design permits partial disassembly for easy maintenance.

Under normal conditions, a 12-

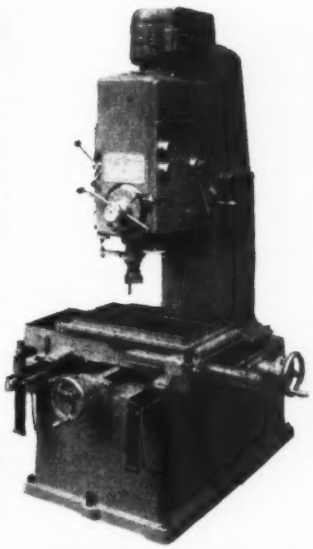
. . . Continued on page 123

THE OPTICAL **JIG BORER**

Of a Capacity That You Need • • At a Price You Can Afford

ABA-TYPE VL 600

- Direct Reading of 5/100,000"
- No Gauge Blocks or Measuring Rods Needed
- No Dependency on Accuracy of Leadscrews
- Made in Western Germany. Based on 25 Years of Experience in Building Jig Borers and Precision-Measuring Tables.
- For Heavy Duty Work and Finest Boring and Facing Operations.
- Factory Trained Mechanic Sets Up Machine at No Extra Cost.



- Working Surface . . . 16"x26"
- Table Traverse . . . . . 17"x26"
- Table to Spindle, max. . . . 21"
- Quill Travel . . . . . 8⅝"
- Weight, Approx. . . . 5600 lbs.

If yours is one of the plants where you have to hog costly jig borers for layout and measuring work, or if you have to spend a lot of time and money for making measuring gauges, you will be glad to learn that ABA also makes an optical layout and measuring table of various sizes to suit your particular need. Please request literature.

LISTEN TO THIS!

No other industrial product in the world enjoys such universal acceptance based on quality and performance as the PARKER PEN. The PARKER PEN COMPANY of Janesville, Wis., is DEPENDING FOR HIGH PRECISION JIGBORING WORK ON THE ABA OPTICAL JIGBORER VL 600. It will never fail them.

WRITE FOR PROPOSAL TO

COLUMBIA INTERNATIONAL CORP.

IMPORTERS OF FINE MACHINE TOOLS

10-35 44TH DRIVE, LONG ISLAND CITY 1, N. Y.

TELEPHONE: STILLWELL 4-1546

VISIT US AT BOOTH #100, A.S.T.E. SHOW, IN LOS ANGELES, MARCH 14 TO 18

CIRCLE INFORM-A-GRAM KEY NO. 1191

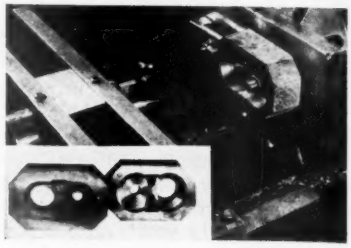
WEDGED-IN CARBIDE SIMPLIFIES CAST IRON BORING

A special boring bar, utilizing a wedged-in tungsten carbide milling blade, is currently being used by the Energy Farm Equipment Co. of Monticello, Iowa, for boring and facing the counterbore of cast iron hydraulic pump parts in one pass as shown in the accompanying photograph.

This operation consists of boring two holes of 2.503-2.506" dia. x 0.878-0.879" deep, and facing the bottom of the bore. Depth of cut is ⅛" to 3/16" on both bottom and side of bore. The workpiece is clamped to the face plate of a 14-inch LeBlond engine lathe which is run at a feed of 0.010 ipr, 140 rpm on the bore, and 57 rpm for facing the bottom of the bore.

This tooling provides part size and finish well within requirements, together with an average of 1,400 pcs/grind.

Total life of their Kennametal (tungsten carbide) Grade K6



blade is approximately 15,000 pcs. Since the price of the Style MA8 blade used is $7.80 each, blade cost per piece machined is only $0.00052, or $0.52 per 1000 pcs.

The wedged-in blade — modified only as to cutting edge and relief angles —is free from any brazing strain. Regrinding is quickly performed by removing the blade from the holder and clamping it in a special grinding block, which is designed to present the blade to the grinding wheel at the required angles.

Gaertner OPTICAL INSTRUMENTATION

TOOLMAKERS' MICROSCOPE

READS TO .0001"

DIRECT COORDINATE MEASUREMENT

PLUS - - -

THESE LISTED FEATURES MAKE THE TOOLMAKERS' MICROSCOPE AN ALMOST INDISPENSABLE INSTRUMENT IN YOUR SHOP OR LABORATORY.

Range 2 x 4 Inches

360° Stage Rotation
Reading To 1 Minute

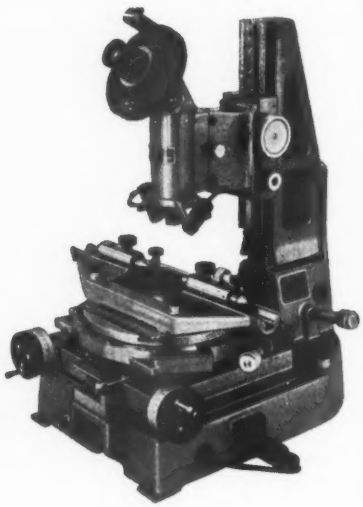
Protractor Circle
Range 360°
Reading To 1 Minute

Magnification 30X

Stage Motion
By 2 Inch
Precision Screws

Column Tilt 8°
For Helix Measurement

Rugged Construction
For Dependable
Accurate Service



ACCESSORIES

Templet Ocular Head

Standard Radius And
Thread Form Templets

Camera and Projection
Attachments

Inch or Metric Scales

Magnification From 10X To 100X

For a completely illustrated book listing detailed specifications and accessories request Bulletin 147-50.

THE GAERTNER SCIENTIFIC CORPORATION
1242 Wrightwood Avenue • Chicago 14, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1291

PAPER-BACKED TAPE PROTECTS POLISHED SURFACES

Polished and finished surfaces are always subject to scratches and die marks during and after fabrication, shipment, and storage.

For the protection of such surfaces, a new black paper-backed

Photo courtesy Minnesota Mining and Manufacturing Co.

protective tape that is 100% resistant to outdoor exposure has been developed. It is believed that this is the first tape of its kind to be entirely resistant to outdoor weathering for periods

up to six months duration.

The tape features a film-like adhesive that sticks immediately upon contact to such materials as stainless steel, aluminum (not anodized), glass, most plated metals, plastic glass, polystyrene, and polyester.

Although the tape's black paper backing resists abrasion, occasional fractures in the backing do not harm the rubbery adhesive which stretches to continue protecting the covered surface during storage and fabrication. (In the photograph the black tape has been retouched white for picture clarity).

Carbide Tooled Automatic Multiple Spindle Machine

Performance of a carbide tooled Bodine automatic, multi-spindle machine, equipped with a rotary table, has shown a conservative 85% efficiency in turning out 1,070 small-motor commutators in a 50-min. hour.

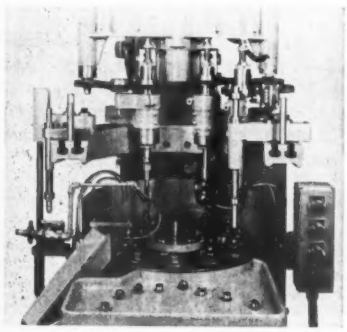


Photo courtesy The Bodine Corp.

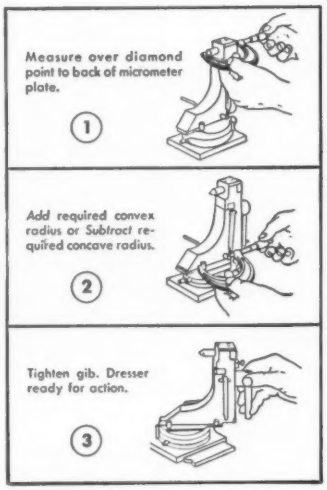
The commutators are made up of a bakelite core with a copper wrap around molded to the bakelite. In the original molding process a center shaft hole is cored in the bakelite.

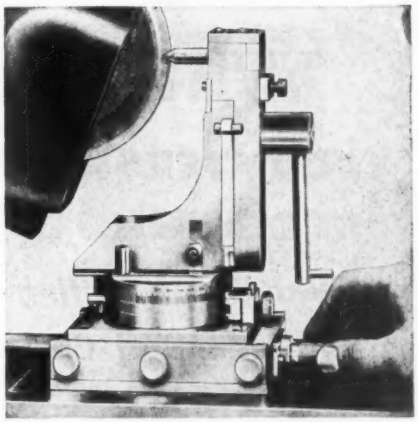
The sequence of machining operations performed on the commutator include: (1) hand loading the part into holding fixture; (2) automatic inspection for positioning; (3) carbide reaming center shaft hole cored in bakelite insert to 0.3145″ — 0.3165″ dia. Subsequent operations are piloted from this reamed hole; (4) carbide hollow milling copper wrap to 0.691″ — 0.693″ O. D., using a piloted hollow mill; (5) carbide facing bakelite shoulder piloting in reamed hole; and (6) automatically ejecting the part.

The copper used is a soft copper, extremely tough, quite abrasive, and requires the use of carbide tools which maintain high production speeds and longer tool life in extremely abrasive materials. Carbides also maintain close tolerances on machining operations.

After the part leaves the machining operation the wrap around copper insert is then slotted through in 10 places so as to produce 10 individual segments in the commutator. After the commutator is press assembled to the motor shaft the diameter which had previously been rough hollow milled is finish diamond turned to effect true size, concentricity, and particularly a good wearing surface for the brushes of the motor.

EASY AS 1 2 3


Measure over diamond point to back of micrometer plate.
1
Add required convex radius or Subtract required concave radius.
2
Tighten gib. Dresser ready for action.
3



YOU CAN DRESS WHEELS UP TO 24" IN DIAMETER WITH J & S "FLUIDMOTION" WHEEL DRESSERS. MODEL REC SHOWN HERE.

The J & S "Fluidmotion" Wheel Dresser

can be set in seconds to dress any angle. Complex concavities or convex shapes can be set in a few minutes.

Fully adjustable with swivel base and patented "Fluidmotion", there is no other method that gives you the "precision flexibility" and ease of dressing simple or complicated shapes and contours.

Write for fully illustrated literature that shows in detail the wide adaptability of the "Fluidmotion" Dresser for just about any wheel dressing job. It comes in several sizes that will dress wheels ranging from the smallest up to 24 inch diameter.

The only "radius tangent to angle" dresser.

J&S TOOL CO. INC.

WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

REPRESENTATIVES IN PRINCIPAL CITIES

J & S TOOL CO., INC.

650 WEST MT. PLEASANT AVENUE, LIVINGSTON, NEW JERSEY

CIRCLE INFORM-A-GRAM KEY NO. 1211

YESTERDAY'S PIONEER . . . TODAY'S LEADER

Patent Applied For

WELDON

COUNTERSINKS and DEBURRING TOOLS

With Single Cutting Edge

Revolutionary! Chatterless!

• Greater ease in cutting is the outstanding feature of these new cutting tools—made for 82° angle countersinking and for 90° angle deburring operations. Have only a single cutting edge which prevents chatter. Both tools are regularly made for right hand cut. One trial will convince you. Special tools of this type made to order.

Write for further details.

WELDON Distributors throughout U. S. A. and Canada carry complete stocks to serve you

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1221

Tough grinding jobs?

Check *Vulcanaire* high speed precision grinding heads!

Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Vertical adaptor for Surface Grinders. Grinding small slots

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

Horizontal application. Grinding a shoulder Punch.

Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.

Major Vulcan Services

Engineering, Processing, Designing and Building... Special Tools... Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. . . . Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

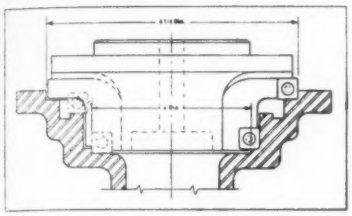
VULCAN TOOL CO.

10 PRITZ STREET • DAYTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1222

. . . Carbide Inserts, from page 119

tip head required reconditioning after a run of approximately 175 pieces. To regrind the brazed boring head and hold all dimensions with a 0.002" tolerance required 20 hrs. If brazing in new tips was necessary, reconditioning time was 34 hrs.



Sketch courtesy Kennametal Inc.

Now, by substitution of Kendex mechanically-held inserts, under similar operating conditions regrinding is entirely eliminated. Standard square Kendex inserts are used — eight style SD-8 and four style SD-12, all of Kennametal grade K6. After 175 pieces are machined, the inserts are rotated to a new cutting edge in a matter of minutes. Since four new cutting edges are available on each insert, 700 pieces are machined after which the inserts are discarded and replaced.

To produce this number of pieces with the brazed head would have required 80 hrs of expensive grinding time.

Conveyor Racks Add Mobility To Work Storage

"Conveyorized Storage" is a new application of Rapistan rack components combined with gravity wheel tracks. This new materials handling device cuts inventory and stock handling steps to a minimum. Through use of gravity force, this rack moves materials to its front, where efficient selection can be made without long aisle walking or hunting.

Reducing the amount of aisle space required for ordinary shelving or bins, Flow-Rack provides greater usable storage in less area, and puts a greater selection of materials within instant sight and reach at all times, whether in order picking or manufacturing operations.

The Flow-Rack is easily assembled or taken down, and is entirely removable for use in other locations. Its "free-standing" design requires no walls, partitions, extra building braces or supports.

Photo courtesy The Rapids-Standard Co., Inc.

TREET-ALL
the
HEVI DUTY
Multi Purpose
FURNACE
for
TOOL ROOM AND
EXPERIMENTAL HEAT TREATING

With a maximum temperature of 1850° F., the TREET-ALL can easily handle your scale free hardening, carburizing, dry cyaniding and silver brazing.

The alloy muffle and gasketed door form a tight seal which simplifies atmosphere control. The furnace, quench tank, cabinet and controls form a compact, completely wired unit.

Write for Bulletin HD-1147-BB

HEVI DUTY ELECTRIC COMPANY
HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY,
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

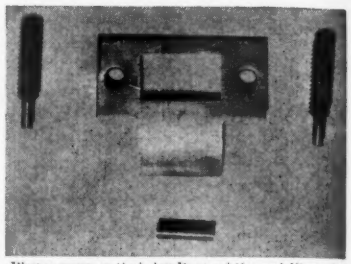
CIRCLE INFORM-A-GRAM KEY NO. 1231

CARBIDE PINS WITHSTAND WEAR ON BUFFING FIXTURE

Production buffing of lock strike plates at the Dexter Lock Co. is performed on a vertical buffer, with racks holding 18 plates — 9 on a side — used as fixtures for suspending the plates in the buffing machine.

Originally two steel pins were used to locate and hold each plate in place on the rack. The work is cycled so that three racks are kept in motion constantly. While one rack of strikes is being buffed, another is being loaded for the operation and the third unloaded.

The buffing action on the steel pins wore them down so fast that it was necessary to press an automatic screw machine into service to turn pins in sufficient quantities to keep up with the pin replacement, this, because the pins had to be replaced every 24 hours. As the rate of wear varied on the 18 pins on each side of the rack, the plates would dislodge from the rack during the buffing and would either be marred by catching on the buffing wheel or be bent out of shape, causing a high rate of rejects.



Photos courtesy Carboloy Dept. of General Elect. Co.

Fig. 1. View shows brass strike plate, center, manufactured at Dexter Lock, Carboloy grade 883 carbide pin below, and Allen-head screws—with carbide pins attached —used to adjust pins in buffing rack.

Fig. 2. Machine operator is shown suspending buffing rack loaded with lock strike plates in buffing machine. Wear resistance of Carboloy carbide pins enabled Dexter Lock to increase production 20%, reduce machine downtime 30% and eliminate pin replacement.

About three years ago the company changed over to Carboloy carbide pins, grade 833. These

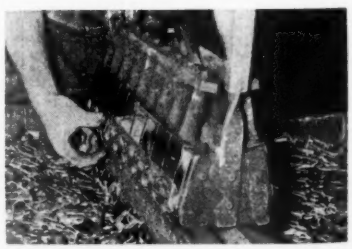
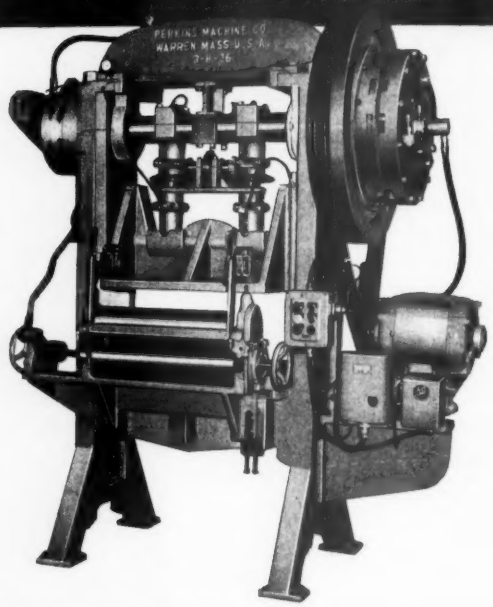


Fig. 3. Brass lock strike plates, here, are being suspended on Carboloy carbide pins on this buffing rack in plant of Dexter Lock Co. Note how pins protrude just enough to hold strikes. Eighteen carbide pins are used on each side of the rack to hold nine strike plates on each side.

The PERKINS 3-H-36 PRESS



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pins are a little longer than a pencil eraser and 5/32" in diameter and after three years the original set is still in service. Buffing rate of the strike plates has been stepped up better than 20% and machine downtime has been reduced between 25 and 30%.

Carboloy grade 883 carbide wears so slowly on this job that Dexter Lock found it expedient to press each carbide pin into an Allen-head screw, which enables each pin to be adjusted easily and accurately to compensate for the thickness of the work.

PRODUCTION LINE VALVES DISPENSE MEASURED LUBRICANT

Dispensing predetermined, measured quantities of lubricant with any discharge output range desired is now possible with a newly developed hydraulically operated valve. Adjusting screws are incorporated in the valve at each end of the measuring chamber for controlling the exact quantity of lubricant output required.

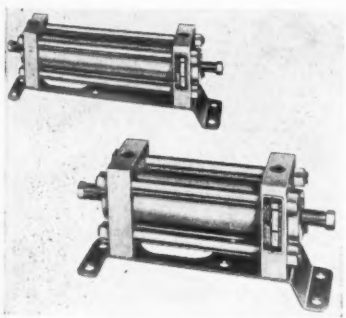

Photo courtesy Lincoln Engineering Co.

These measuring valves are designed for use with a four-way control valve, which is supplied with lubricant from a power-operated pump. The system provides for automatically applying metered quantities of oil or grease to gear cases, small transmissions, bearings, and electric motors in assembly line operations.

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- Made of Chrome-Moly Steel, hardened inside and out.

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(Left) Hancock CHUKOLLET used for milling operation on soft threaded parts

(Right) CHUKOLLET can be used at any angle or compound angle

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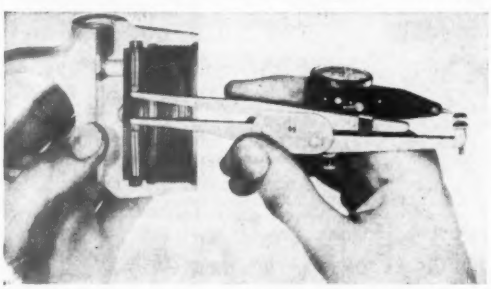

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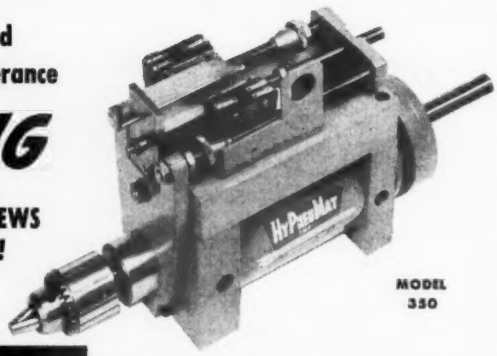

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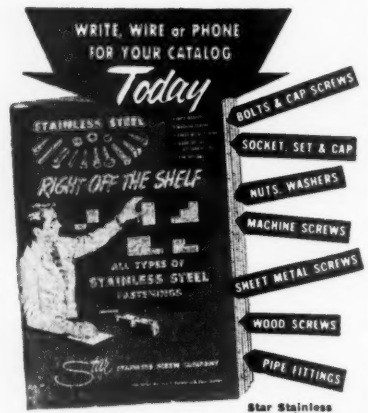

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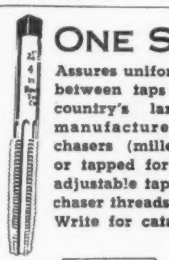

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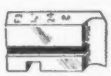

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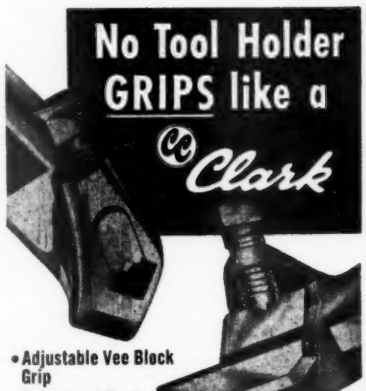

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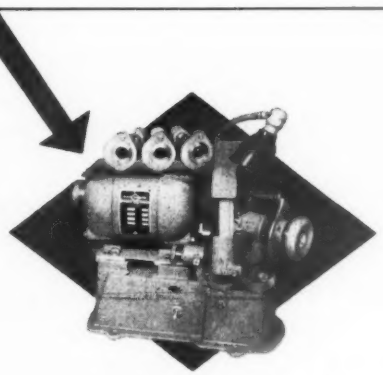

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NEW APPROACHES TO INDUSTRIAL FINANCING

Two organizations — C.I.T. Corp., industrial financing firm, and the Gisholt Machine Co. — have announced new payment plans for machine tools, lift trucks, and construction equipment as a result of new tax codes and the faster depreciation allowable on new equipment.

The C.I.T. instalment financing system makes it possible for purchasers to pay for a machine at substantially the same rate the machine can be depreciated. Using the "sum of the digits" method of depreciation, 73% of the depreciable cost of a machine with a useful life of 10 years can be written off in the first five years. Payments are graduated to match the depreciation schedule rather than made equal and therefore can be written off in depreciation each year. Normal down payments, the firm states, will still apply.

Under the Gisholt plan, any new machine can be obtained with an initial down payment of 20%. The balance may then be spread in equal payments over 12, 24, 36, or 48 months. The Gisholt method reverses the usual pattern of handling interest charges by starting with the lowest amount and gradually increasing.

This method, according to company thinking, favors the buyer because it gives him the use of that much more cash during the earlier payments. The buyer has the privilege of pre-paying notes at any time without penalty, however, and may thus avoid the higher interest payments toward the end.

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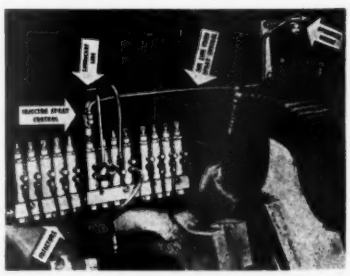
Centralized lubrication systems to provide controlled mist lubrication for open gears are made automatic by means of a new spray control valve.

The valve may be assembled to any lubricant injector in the centralized system, mounted adjacent to, or remote from, the gears to be lubricated. As the injector begins to discharge lubricant, movement of the injector indicator stem permits the spray control valve to open, allowing regulated air to pass the spray nozzle. The lubricant is thus atomized into a fine, uniform mist of air and lubricant. Lubricant output can be increased, as desired, by diverting lubricant from two or more injectors through the lubricant line to the adjustable spray nozzle.



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"THROW-AWAY" TOOLS ELIMINATE GRINDING IN SHOP

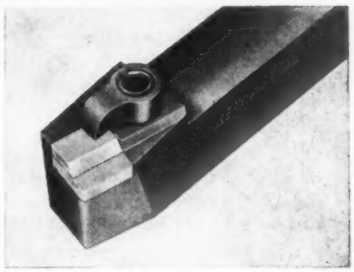
A new low-cost type of tungsten carbide tooling has been added to the Kendex line. "Throw-away" carbide inserts which may be turned over and used on each side prior to disposal eliminate all grinding in the user's shop, cut cost per cutting edge, provide a new system of chip control, and may be indexed in seconds.

This new tooling is provided in two types: Kendex button tools, and heavy-duty Kendex tools. On the button tools a removable chipbreaker is used, while on the heavy-duty line a hardened clamp serves as a chip deflector.

Kendex button tools with square or triangular tungsten carbide buttons are available in two finishes: "regular", which are molded to size with the nose radii and top and bottom surfaces ground, and "precision", which are ground all over for accurate on-the-job indexing.

The heavy-duty tools are furnished with rectangular carbide inserts having a 15° lead angle and parallelogram-shaped carbide inserts for cutting to a shoulder. Only "regular" inserts are available in the heavy-duty line. Inserts are ground to index within ± 0.005".

Top clamps provide quick indexing; inserts are held in the shank at 5° negative rake angles and can be turned over to use cutting edges on both sides. After all the cutting edges are used, the inserts are thrown away — eliminating all grinding costs.



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SOME CHIPBREAKERS DO AND SOME DON'T!

Chipbreakers may hold the key to your production machining problems.

Warner & Swasey Co., Cleveland, for example, faced the problem recently of removing ⅛ to 3/16" stock from the face of a long feed cam. The cam was of 4150 hand-forged steel, with a Brinell reading of 302 - 321.

In early setups, the job was turned at 223 sfpm (15" stock dia. at 57 rpm) and a feed of 0.015". Several standard grind, lead-angle facing tools of Carboloy grades 370 and 78B carbide with groove-type chipbreakers were tried, but without satisfactory results. The lead invariably snapped off as the tool broke the bore.

In subsequent tests with the same grade carbides, the tools were tried with shelf-type chipbreakers.

That did the trick. The change eliminated both tool breakage and production downtime.

THE Hause Holomatic DRILL UNITS

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AIR ACTUATED HYDRAULIC FEED

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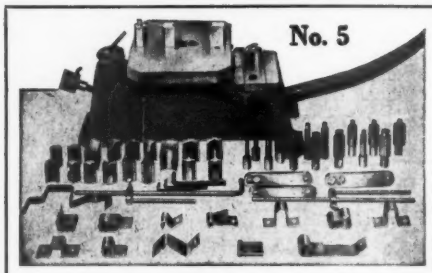

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For additional information, contact Factory Service Co., 4635 N. 21 St., Milwaukee 9, Wis., or **Circle Inform-A-Gram Key No. D7.**

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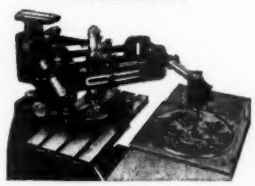

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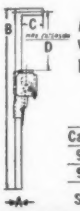

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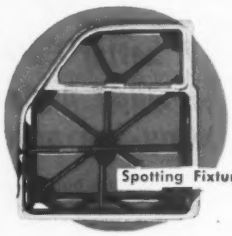

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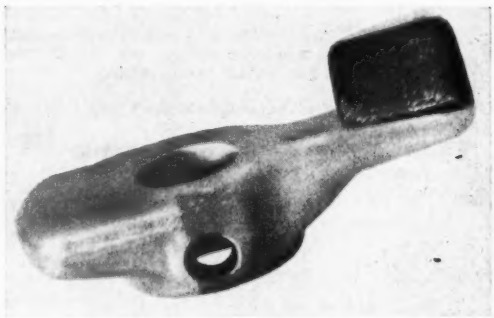
FLAME-PLATING GIVES ALUMINUM TUNGSTEN CARBIDE WEAR-RESISTANCE

How to make a lightweight drive arm with high wear-resistance posed a difficult design problem to the Herman Nelson Division of the American Filter Company, manufacturers of aircraft heater mechanisms. Plastic inserts, high alloy precision castings, and machined high alloy forgings were considered, but high cost or excessive weight made them impractical. The problem was solved by using a forged aluminum part which had been plated with tungsten carbide by Linde Air Products Company's Flame-Plating process. In this manner an unusual combination of lightweight, low inertia, and high resistance to wear was developed. An unplated forged aluminum drive arm had an expected service life of 100-300 hours. After Flame-Plating this part easily exceeded the required 1000 hour mark.



This forged aluminum drive arm for an aircraft heater mechanism is subjected to severe sliding abrasion and originally had a varying life of 100-300 hours. By Flame-Plating the wear surface of this part with tungsten carbide an unusual combination of high wear-resistance and lightweight was achieved. Service life is now rated at more than 1000 hours.

Flame-Plating was developed by Linde Air Products Company, a Division of Union Carbide and Carbon Corporation, for depositing a thin tungsten carbide coating on the surfaces of parts and many types of tools where extra wear-resistance is required. Most common metals can be plated. Because the temperature of the part being plated does not exceed 400° F., the possibility of a change in the physical properties of the base metal is eliminated and reduces to a minimum the chance of distortion. For this reason, the process is well-suited for use on finished or semi-finished parts where the physical properties have been pre-determined.

The tungsten carbide coating may be left on the part in the coated condition (125 microinches rms) as in the case of the forged aluminum drive arms, or ground and lapped to a mirror-like smoothness (1-5 microinches rms) for such applications as plug gages.

Plug and ring gages, gripping dogs, turbine shaft seals, and core rods are a few of the current Flame-Plating applications where outstanding success had been recorded.

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Wire termination assembly can be performed four times faster than conventional methods by use of the new Lok-A-Block terminal block.

This terminal block consists of three elements: (1) red colored housing block; (2) solderless connectors; and (3) a yellow colored Lok-Strip which holds the assembly together.

With these parts, terminal blocks can be assembled.

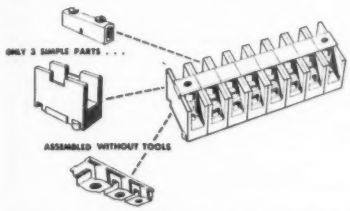

Photo courtesy of Ilsco Copper Tube & Products, Inc.

First step for assembly: Place red blocks in a row side by side, interlocking them by means of notches provided. Then insert 6 solderless lugs into block from top. Place an additional block at each end without lugs, to act as mounting brackets.

Second step: The Lok-Strip comes in 28 sections. Break off an 8-section piece by hand.

Third step: The 8-section piece is locked into the block assembly by compressing together by hand. It engages all blocks to hold them together in a row and applies pressure to the solderless lugs, restraining them against excessive movement.

Fourth step: Punch out top holes on end of yellow Lok-Strip and bottom of red block with a hand tool.

Result is a complete unit ready for mounting to device by means of mounting screws.

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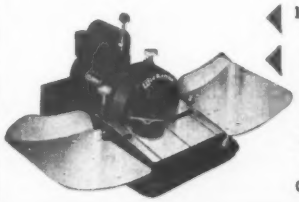

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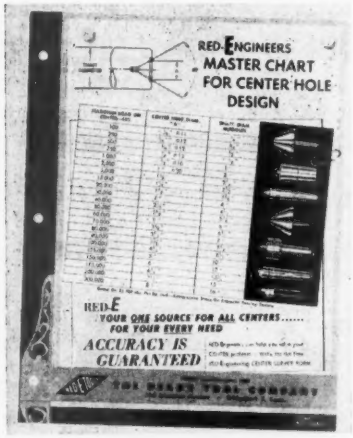
Center Hole Chart. Due to the recent change in center drill standards as set up by the Center Drill Manufacturers, the Ready Tool Co. has reissued their "Engineers Master Chart for Center Hole Design," conforming to the new numbering system. The new sizing method has reduced the number of drills necessary and simplified the coding of sizes considerably. With these new numbers listed, the Red-E chart is a valuable guide for determining center hole sizes. The chart shows the center hole sizes required for minimum shaft diameters of ¼" to 16" and maximum center loads of 100 to 300,000 lbs. Ready Tool Co., 554 Iranistan Ave., Bridgeport 5, Conn., or—**Circle Inform-A-Gram No. C1**



Carbide Tool Information, such as hints on how to make carbide tools give top performance; notes on the manufacture and maintenance of carbide tools; recommended feeds, speeds, and lubricants; and do's and don'ts in using carbide tools, are a few of the features in The Atrax Co.'s catalog No. 554. Six illustrated case history reports show how production difficulties were solved with the use of carbide reamers, tool bits, end mills, burs, drills, and special cutters. Also included in the 20-page reference section of the catalog is a hardness conversion table and a list of carbide grade classifications and manufacturer's grade recommendations for comparison. The Atrax Co., Newington 11, Conn.
Circle Inform-A-Gram No. C2

"Cost Accounting for Heat Treating" is a complete report of the Metal Treating Institute Cost Accounting Committee's efforts to develop a basic cost system which can be adapted to all types of heat treating operations, private or commercial. The system is described in a series of four papers, each providing illustrations of the forms needed to utilize the system. They are presented in a clear, easily understandable manner and anyone familiar with heat treating practices will be able to determine the applicability of the system to his own operations. Copies of the 16-page booklet are available from the Metal Treating Institute, 271 North Ave., New Rochelle, N. Y. **Circle Inform-A-Gram No. C3.**

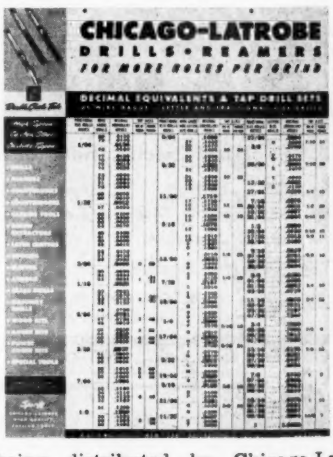
"How To Train," the fourth booklet in the series on cost reduction for industrial plant management, has just been announced by Wheeler Associates, Inc., Cleveland management and engineering consultants. Preceding booklets dealt with materials handling, industrial maintenance, and plant layout. The latest edition deals with the various facets of training both plant and supervisory personnel. Subjects as when to train, who should be trained, who should do the training, and what to teach, are explained in detail. Copies of the booklet are available from Wheeler Associates, Inc., 15017 Detroit Ave., Cleveland 7, Ohio.
Circle Inform-A-Gram No. C4

Screw Machine Stock Buyers and operators can make quick stock requirement estimates on aluminum parts with the slide-rule calculator now available from Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, Calif. The device instantly gives the amount of aluminum stock needed for 1,000 screw machine parts with combination dimensions ranging from ¼" to 3" in length and ⅛" to 3½" in diameter. Lbs-per-ft, ft-per-lb, and fractions-to-decimal equivalents for round and hexagon aluminum stock diameters from ⅛" to 8" in available alloys can also be calculated. An additional table on the calculator lists typical mechanical properties for aluminum screw machine stock, including 2011-T3, 2011-T8, 2017-T4, and 6061-T6. Get your calculator from Kaiser, or—**Circle Inform-A-Gram No. C5**

"Abrasive Grain and Finishes" for use in metal finishing is a new booklet by the Carborundum Co., Niagara Falls, N. Y., packed with informative charts and illustrations and many of the company's latest abrasive engineering recommendations. The 42-page booklet contains a suggested layout for set-up and curing rooms, and devotes a chapter each to metal buffing, metal tumbling, and pressure blasting.
Circle Inform-A-Gram No. C6

"Machining Aluminum" covers such specific problems as types and shapes of tools, preparation of drills, tool materials, tapping and threading, reaming, spinning, sawing, lubricants, and the use of rubber to supplant expensive negative embossing dies. The text of this 4-page bulletin is written in non-technical language and is supplemented with illustrative line drawings. The booklet is from the Metallurgical Dep't, The George Sall Metals Co., Inc., 2308 E. Butler St., Philadelphia 37, Pa. **Circle Inform-A-Gram No. C7**

Decimal Equivalent Chart. A good-size wall chart 18", by 24", which shows decimal equivalents and tap drill sizes for wire gauge, letter size, and fractional size drills is now being distributed by Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill. The sturdy, three-color chart is punched for wall hanging. Request a chart for your shop on your letterhead, or **Circle Inform-A-Gram C8**



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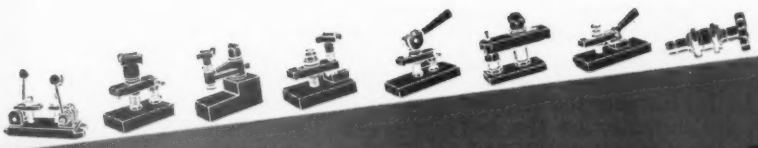

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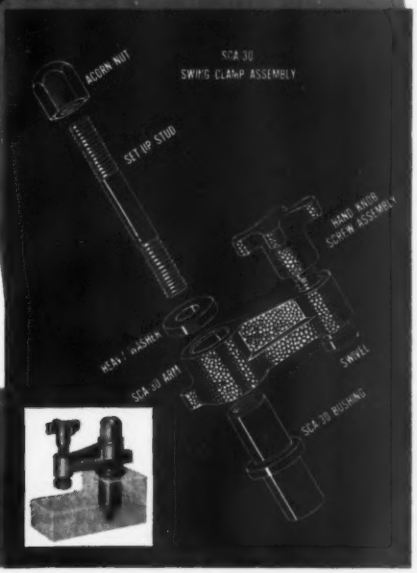

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. . . Lathe Controls, from page 96

Figure 3 where a 2L saddle type lathe has been equipped with a telescoping, remote spindle control. In this instance the controls which are mounted on the box include those necessary to start, stop and reverse the spindle.

From the control panel just discussed it was only a logical and simple step to move to the use of a complete push button control assembly mounted on a sliding pendent. This control box is shown in Figure 4 and is capable of controlling all machine operations including the spindle, coolant system, power chuck, and inch control. The lever at the left of the box is used to move the control panel out to the position required by the workpiece in the lathe.

An adaptation of the telescoping control box may be seen in Figure 5 where all controls for the machine have been located on the box with the addition of an adjustable torque control dial. The torque dial is useful for the installation of seat rings in the machining of gate valve bodies.

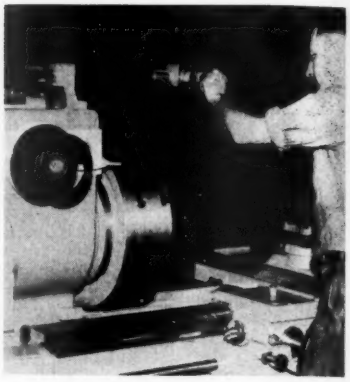

Fig. 3. This telescoping remote spindle control is equipped with start, stop and reverse buttons.

In one instance the extra length of the workpiece handled by a No. 5 ram type lathe made it necessary to provide duplicate controls. The lathe shown in Figure 6 is used to machine the ends of heavy locomotive axles which weigh 1,480 lb. Simple machining is done from both the turret and cross-slide with each end being machined in a single operation. Floor-to-floor time is 8.6 minutes per end. Basically

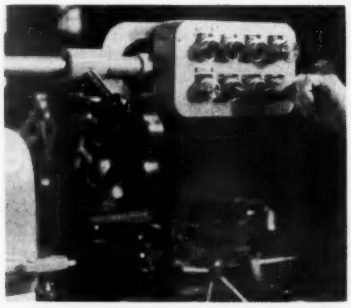

Fig. 4. Here is a complete push button assembly that gives control of the spindle, coolant system, and power chuck. The lever on the bar is used to move the control panel to the desired location.

this is a standard machine, but it has been equipped with the special length bed and extended controls on drives. Since the normal machine operation requires the machinist to be some distance from the headstock, the hydraulic speed selector mounted on the headstock has been duplicated convenient to the work and linked mechanically. These selectors are connected in tandem and any movement of either hand wheel causes a corresponding movement on the other hand wheel. The operator can select spindle speeds without leaving his working position, all the

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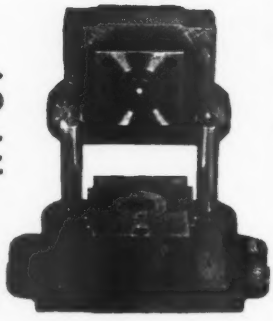

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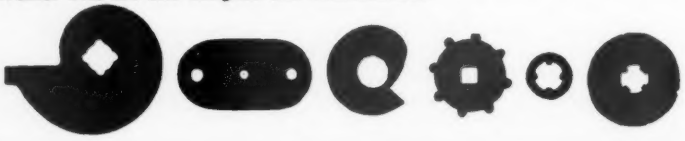

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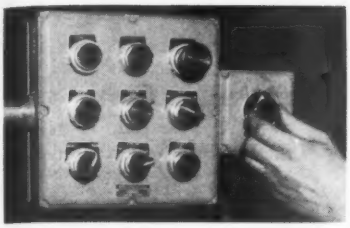

Fig. 5. An addition to the control panel made for the job of machining gate valve bodies is the adjustable torque control dial shown here.

shifting being done hydraulically. In this way the operator has complete control of the machine from the area where the work is performed.

Another case of a workpiece making it necessary to alter a standard machine is shown in

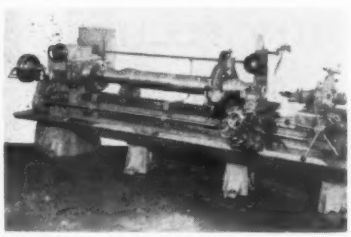

Fig. 6. Length of the work shown made it necessary to duplicate the hydraulic speed selector. The selectors are linked mechanically so that any movement of one is reproduced on the other.

Figure 7 where an alloy steel propeller shaft measuring 36½ in. is set up for the machining of various inside diameters. The standard side carriage was not furnished with this machine, and

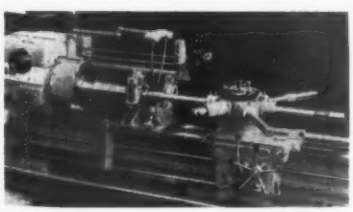

Fig. 7. This close-up view shows a saddle type turret lathe which has dual speed selectors as well as remote control of start, stop, inch and reverse.

this permitted use of a special quick-clamping steady rest and boring bar support instead of the side carriage. And for safety and full control of the operation the hand wheel for the hydraulic speed selector and the emergency push-buttons are duplicated at the working position. The emergency controls include start, stop, reverse and inch buttons.

BOSTON I. E.'S ACTIVE IN A. I. I. E.

The American Institute of Industrial Engineers has become a professional "sounding board" for the promotion of new ideas and the interchange of technical "know-how" for processes and procedures that are beneficial to both the Industrial Engineer and production management.

The two-year-old Boston (Mass.) Chapter of the A.I.I.E. meets monthly at the Smith House in Cambridge to discuss topics and problems pertinent to the field. While membership is limited to I.E.'s, guests are welcome at the meetings, according to the Chapter's publicity chairman, Donald D. Fishman, an Industrial Engineer at the Farrington Manufacturing Co. in Boston.

The Boston Chapter roster lists approximately 70 members. Herb Margoshus is program chairman and Marshall Schneider is membership chairman.

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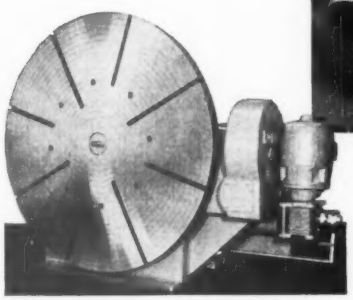

The New ROTAB

ROTAB now gives you fast, accurate checking of complex shapes at a minimum investment in fixtures:

1. **Microscopic Precision**—Direct reading to 5 seconds.
2. **Faster Multiple Inspection**—Simple inspection operations provide closer quality control on radial and angular checking.
3. **Finger-Tip Operation**—Quick acting, positive controls for table tilt and rotation.
4. **Easy Reading**—Checking and measuring planes conveniently positioned.
5. **Four Standard Sizes**—Select the model best suited to your jobs. Face plate diameters available are 12", 24", 36" and 48".

Write for the complete ROTAB *story.*

MACHINE PRODUCTS CORP.
6771 East McNichols Rd. Detroit 12, Mich.
Dept. C

CIRCLE INFORM-A-GRAM KEY NO. 1371

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

A New Heading Die featuring sectional construction is introduced in a brochure on Champion carbide heading dies for hexagon recessed screws. This die may be taken apart and new inserts and recessed head caps may be replaced when worn. Champion Tool & Die Co., McKeesport, Pa.
Circle Inform-A-Gram No. B1.

Sun Quenching Oil No. 11 is described in a new Suncoo bulletin. This oil's high thermal stability and high boiling range make it particularly suitable for quenching systems requiring a high flash-point. Get your bulletin from Sun Oil Co., Philadelphia 3, Pa.
Circle Inform-A-Gram No. B2.

Face Grinders. A new concept in precision face grinders, the Besly-Bowen Radial Head Grinder, is explained in a 20-page bulletin from that company. Diagrams and performance data show how this type of grinder increases production by using two work stations and automatically indexing the grinding head over each of them on alternate grinding cycles. For a copy of Bulletin 700, write Besly-Welles Corp., Beloit, Wis., or—
Circle Inform-A-Gram No. B3.

"Norelco Portaflux—New Portable Magnetic Particle Test Unit" describes the magnetic particle method for checking ferrous metal objects for surface discontinuities. Get your copy of the illustrated booklet from Mt. Vernon Div'n, North American Philips Co., Inc., 750 S. Fulton Ave., Vernon, N. Y.
Circle Inform-A-Gram No. B4.

Five Related Digital Instruments for automatic counting, recording, and control, are shown in a new brochure available from Brush Electronics Co. 3405 Perkins Ave., Cleveland 14, Ohio. The five units consist of a Cycling Counter, Timer Interval Meter, combination Counter-Timer, Preset Counter, and Recording Unit. They are applicable in manufacturing for quality control, process control, packaging, production testing, and gaging.
Circle Inform-A-Gram No. B5.

The Resistance Welding Machine catalog by Sciaky Bros. gives an overall view of the main Sciaky resistance welding machines, citing examples of use on mild steel, stainless steel, and aluminum. The four major sections in Bulletin 333 cover industrial applications, manufacture and service, principles of operation, and types of machines. Write to Sciaky Bros., 4915 W. 67 St., Chicago 38, or—
Circle Inform-A-Gram No. B6.

Electric Hoists. The heavy duty construction and operational features of a new line of electric hoists manufactured by R. G. LeTourneau, Inc., Longview, Texas, are illustrated and explained in a colorful 6-page folder. Capacities of four to 15 tons are covered, although the complete LeTourneau line ranges from three tons to any desired capacity.
Circle Inform-A-Gram No. B7.

Variable Speed Drive. The Cleveland Speed Variator is an improved model of a drive unit invented and used for years in Europe. Bulletin K-100 from The Cleveland Worm & Gear Co., 3249-59 E. 80 St., Cleveland 4, pictures the Cleveland Speed Variator and describes its patented design features. The complete line features sizes from ½ through 10 hp.
Circle Inform-A-Gram No. B8.

Norton G Bond wheels set new economy records in O. D. grinding

Users tell how* "TOUCH of GOLD" *performance boosts production rate, product quality and profits

"*Production rate increased* 35% by G Bond wheels, with a greatly improved finish," are two typical "Touch of Gold" advantages reported by the user performing this cylindrical grinding operation. Job calls for .025" stock removal from 1040 seamless, steel tubing, with ⅛" wall. The machine is a Norton — a reminder that only Norton offers you such long experience in both grinding machines and wheels, to help you produce more at lower cost.

CIRCLE INFORM-A-GRAM KEY NO. 1381

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

Die Handling Trucks. Details of its new line of hydraulic die handling trucks are contained in new literature available from The Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio. The trucks, because of their unique design, are able to perform numerous die handling operations with advantages never before possible.
Circle Inform-A-Gram No. B9.

Screw-Lock Inserts. Selection tables, line drawings showing proper installation in blind and through holes, and instructions on the use of the new Heli-Coil screw-lock inserts, are all listed in 4-page Bulletin 715-A. The inserts feature a constricting grip-coil at the bottom for producing a strong locking force. Heli-Coil Corp., Danbury, Conn.
Circle Inform-A-Gram No. B10.

"G Bond wheels last up to 40% longer," reports this centerless grinding customer. The piece is a vanadium alloy steel spindle ¼" diameter x 10" long, with a tapered shank — ground in a plunge cut which removes an average of .045". With G Bond they found that wheel life increased 30% to 40% because this greatly improved vitrified bond breaks down evenly.

Users all over the country report that Norton G Bond wheels have given them an entirely new slant on the profit-possibilities of their centerless and cylindrical grinding jobs.

The two examples pictured here are typical of the very many enthusiastic endorsements that are pouring in. And you could sum them all up in this sentence: "G Bond wheels grind faster, finish better, last longer and save us money on every job."

The Norton G Bond is by far the most efficient vitrified bond ever developed for precision and semi-precision grinding. Wheels made with it outperform all others, with "Touch of Gold" advantages like these:

Cooler cutting action . . . faster stock removal . . . better finish . . . more pieces per dressing . . . longer wheel life . . . easier dressing, with less wear on diamond or on crushing roll.

See your Norton distributor
for proof of how G Bond wheels can help improve your products and cut your production costs. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Making better products . . . to make your products better

W-1607

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

CIRCLE INFORM-A-GRAM KEY NO. 1381

To Give Employees a better understanding of your business and the business world in general, **Enterprise,** a business magazine for rank-and-file office and factory employees, is what you need. Each month this publication looks at some particular department of business—inventory, personnel, and "diversification," for example. Use the magazine, as Bullard Co., R. K. LeBlond Machine Tool Co., Union Carbide, and other industries do, as a supplement to regular employee communications. Enterprise Publications, 11 N. Wacker Dr., Chicago 6.
Circle Inform-A-Gram No. B11.

Hysteresis Synchronous Motors that are ideally suited for all applications requiring constant speed, such as turntables, are described in an illustrated catalog (No. 403-2) offered by Technical Development Corp., 4060 Ince Blvd., Culver City, Calif. Various models with speeds from 300 to 1000 rpm, operating on 117 volts, are available.
Circle Inform-A-Gram No. B12.

Carbide Tools & Blanks. A condensed catalog which reflects latest price changes and specifications on all standard cemented carbide tools and blanks is announced by Carboloy Dep't, General Electric Co., Detroit. The 24-page "Brief-A-Log" GT-285 lists for the first time specifications and prices on throw-away inserts, new saw tips, solid and brazed type woodworking knife blanks, right and left-hand offset threading tools, and blanks for roller turner tools.
Circle Inform-A-Gram No. B13.

A Marblette Epoxy Resins permanent reference folder is being distributed by the Marblette Corp., 37-21 Thirtieth St., Long Island City 1, N. Y. A pocket of the colorful folder holds Marblette technical literature. To keep the folder up-to-date, the company periodically sends new bulletins, circulars, manuals, case history reports, and catalog information for insertion in the folder.
Circle Inform-A-Gram No. B14.

Precision Instrument Parts and mechanical components in standard sizes and designs are being manufactured by PIC Design Corp., 160 Atlantic Ave., Lynbrook, L. I., N. Y. A new 64-page catalog, illustrating the complete line of precision shafts, gears, collars, etc., is now available. All items in the catalog are dimensioned for design and detail layout. Complete tolerance specifications enable the designer or engineer to mount associated equipment.
Circle Inform-A-Gram No. B15.

American Broach's Catalog 450 is more than a catalog. It is an extensively illustrated reference book on broaches, broaching, and broaching machines. Special sections on the design of all types of broaches and their applications make this an extremely valuable booklet.
Circle Inform-A-Gram No. B16.

Helical Carbide Tipped End and shell mills by Wendt-Sonis Co., Hannibal, Mo., are described in a new folder. Prices, specifications, design and application data for the "Shear-Carb" mills are included in the booklet. **Circle Inform-A-Gram No. B17.**

Masters' Vertical Miller with swivel head, direct gear drive, and eight speed gear box is featured in literature now available from Masters Machinery Supply Co., 3616 Archer Ave., Chicago 9.
Circle Inform-A-Gram No. B18.

A New Hydraulic Motor, suitable for operations to 4000 rpm and 3000 psi, is announced in a descriptive folder published by United Hydraulics, Inc., 110 Terrel Ct., Dayton 7, Ohio. Performance data and installation sheets for three models are included in Bulletin M-110.
Circle Inform-A-Gram No. B19.

ARMSTRONG
WRENCHES
ARMSTRONG U. S. A.
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Choose Your Wrenches as you do your friends--for life
Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.
Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength. Each is beautiful in finish and line, is a quality tool to be proudly possessed by any mechanic—or certain to "give a lift" to any assembly line. Buy wrenches which carry the trade marks HI-TEN or ARMALOY On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality
WRITE FOR CATALOG
ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5200 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1401

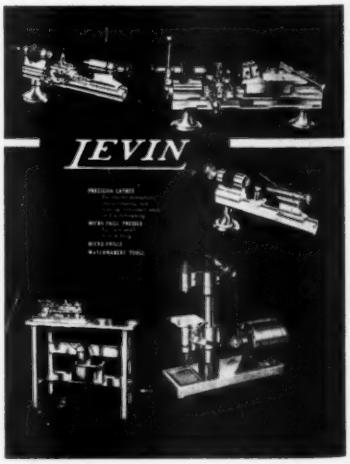
"Metal Stampings in Small Lots" presents the Dayton Rogers small lot stamping story and gives actual cost records for work done by D-R. Typical examples of parts which the company manufactured are listed and pictured in the bulletin. Get your copy from Dayton Rogers Mfg. Co., Minneapolis 7, Minn., or—
Circle Inform-A-Gram No. B20.

"Heavy Duty Weight and Tension Indicating Instruments," Bulletin MI 15, is a catalog-type brochure that pictures and describes all of Martin-Decker's hydraulic materials handling equipment. Such items as hook scales, tensiometers, crane weight indicators, etc., are shown. Martin-Decker Corp., 3431 Cherry Ave., Long Beach, Calif.
Circle Inform-A-Gram No. B21.

Short Run Stampings. Factors that help to cut down the cost of stampings are discussed in Bulletin 201, published by Federal Tool & Mfg. Co., 3640 Alabama Ave., Minneapolis 16, Minn. Typical stamping tooling cost examples are included in the bulletin, available from the stamping firm, or—**Circle Inform-A-Gram No. B22.**

An Actual Aluminum Part is attached to "New Angle on Greater Profits," citing the advantages of the aluminum for screw machine stock. Each folder has a knurled cap part fastened to a drawing of a piece of aluminum stock protruding from a screw machine collet, and illustrating tool angle. Get your copy from Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, Calif.
Circle Inform-A-Gram No. B23.

Micro Drills, Presses, and precision lathes for second operations, tool making, instrument making, or for any minute machining operations,



are listed in the comprehensive Levin Catalog M from Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, Calif.
Circle Inform-A-Gram No. B24.

Electro-Graphic Detector Systems are explained in a new brochure by the developers of these wired-in checking systems. They consist of separate electrical circuits wired to schematic electrical diagrams and

are designed to meet the problem of service and maintenance in the designing and building of automation equipment. Get your copy from W. F. & John Barnes Co., 301 S. Water St., Rockford, Ill.
Circle Inform-A-Gram No. B25.

Indicating, Recording, and Controlling Instruments by United States Gauge are summarized with text and photos in Publication GL-1. Various types of "Gotham" industrial thermometers, pressure recorders, etc. are listed in the booklet from United States Gauge, Div'n of American Machine & Metals, Inc., Sellersville, Pa.—**Circle Inform-A-Gram No. B26.**

Optical Comparator. The "Target" Duplex Shadowgraph Comparator by the Portman Instrument Co., Town Dock Rd., New Rochelle, N. Y., is an economy-size unit suitable for on-the-spot inspection right alongside machinery. A bulletin covering design and construction features of the comparator is now available from the manufacturer.
Circle Inform-A-Gram No. B27.

The Facilities and Experience of a complete single-source engineering service are detailed in an attractive brochure (PE-25) just released by Pioneer Engineering & Mfg. Co., Inc., Detroit. Product design and development, manufacturing cost studies, and production engineering are discussed in relation to industry's engineering requirements.
Circle Inform-A-Gram No. B28.

Tandem Mills for the high speed reduction of non-ferrous and ferrous rod are covered in an 8-page booklet published by Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. Various size mills are described and work samples and a cross-sectional reduction sequence are featured. A partial list of other metalworking equipment built by Waterbury Farrel is also included in Circular 729-R.
Circle Inform-A-Gram No. B29.

Blanking Presses. Detailed information on Waterbury Farrel blanking presses having a 300 rpm to 900 rpm range is given in a new booklet published by the Press Div'n of Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. Ask for Circular No. 915-N-2.
Circle Inform-A-Gram No. B30.

"Science and Skill in Sheet Metal" shows many of the processes used and parts produced in sheet metal at Geuder, Paeschke & Frey Co., 324 N. 15 St., Milwaukee 1, Wis., 70-year-old sheet metal processing concern.—**Inform-A-Gram No. B31.**

Machine Tools. The 1955 Sheldon catalog illustrates and describes 18 different machine tools, including many new Sheldon lathes. A special section on selecting a lathe is a useful reference guide. Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago 41, Ill.—**Circle Inform-A-Gram B32.**

Roller Conveyors of the heavy duty type are described and illustrated in colorful Catalog No. 60 issued by The E. W. Buschman Co., Clifton and Spring Groves Ave., Cincinnati 32, Ohio. Complete data on roller design and conveyor layouts is presented.—**Circle Inform-A-Gram B33.**

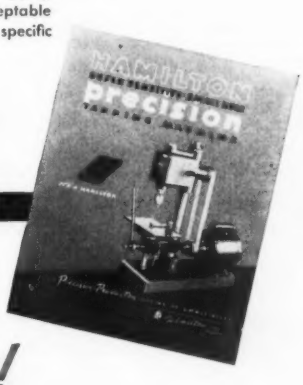
5203-R

IT'S A HAMILTON

INDEED

There is no way under the sun to do small, precision tapping with "production" speed, satisfactory tap life and acceptable accuracy, other than to use a tool designed for the specific purpose.

THE *Hamilton* SUPER-SENSITIVE SMALL HOLE TAPPING MACHINE IS SUCH A TOOL!



WANT ALL THE FACTS ?

Write for Hamilton Bulletin No. 5203. Address The Hamilton Tool Company, 832 South Ninth Street, Hamilton, Ohio.

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 1411

Tap Holder. The Marcellus "Releasing-Type" tap holder is the subject of Bulletin No. M-2, published by Marcellus Mfg. Co., Belvidere, Ill. This tap holder is designed to disengage automatically at the correct tap depth after the initial set-up. It is accurate yet rugged.
Circle Inform-A-Gram No. B34.

With the U. S. Multi-Roll Cradle, strip stock is unwound easily and rapidly for controlled feed to the press. Specifications and details on the Multi-Roll unit are in Bulletin 90-P from U. S. Tool Co., Inc., Ampere, N. J.
Circle Inform-A-Gram No. B35.

Power Hack Saws are the subject of the illustrated Bulletin 954 being distributed by Sales Service Machine Tool Co., 2363 University Ave., St. Paul 14, Minn. Full information on ten models is given on Keller saws up to 9" by 9" capacity.
Circle Inform-A-Gram No. B36.

The King Portable Brinell Hardness Tester is the subject of a 4-page illustrated folder recently published by Andrew King, 67 E. Lancaster Ave., Ardmore, Pa. A removable test head makes it possible to test parts of any size with the King Portable.
Circle Inform-A-Gram No. B37.

Now—Lock Your Feed Rates to Protect Machines . . . Reduce Costs with the CROSS Flow Control Lock!

Only authorized personnel carry a key for the Cross Flow Control Lock! They set machine feed rate, then lock it.

Easy to install. Just remove valve nameplate and adjusting lever, reinstall over lock mounting plate.

Available for Vickers 1/4" flow control valves and remote control panels.

For full details, write Dept. A-72

- Eliminates Tampering
- Stops Costly Shutdowns
- Prevents Tool Abuse and Breakage
- Protects Machines Against Overloads
- Reduces Maintenance Costs

Established 1898
THE CROSS CO.
DETROIT 7, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1421

"Cutting and Grinding with Johnson's Wax Cutting Fluids" describes the advantages of wax in metalworking as well as the comparative machinability rating of various steel

grades. Cutting fluid selection charts aid in choosing the right coolants and lubricants for various machining operations and metals. Get your copy from S. C. Johnson & Son, Inc., Racine, Wis.
Circle Inform-A-Gram No. B38.

"The Lively Life and Times of Presteel" uses sketches and photos to provide an historically interesting picture of the 50-year-old Worcester Pressed Steel Co. in Worcester, Mass. A facsimile of a patent drawing dated April 28, 1868, which turned out to be the first practical answer to the problem of cold-drawing metal products, is one of the features.
Circle Inform-A-Gram No. B39.

"NesTier Case Study No. 1," the first in a series of methods improvement studies analyzing actual installations, shows how NesTier small parts handling equipment cuts costs and increases production at NuTone, Inc. Write to The Chas. Wm. Doepke Mfg. Co., 8911 Blue Ash Rd., Rossmoyne, Ohio, or—
Circle Inform-A-Gram No. B40.

Spraywelder. A 4-page, two-color illustrated bulletin describing the new Model C Spraywelder and the Sprayweld process is now available from Wall Colmonoy Corp., 19345 John R St., Detroit 3. The Spraywelder is a metal powder spraying unit used in welded overlay type hard-facing applications.
Circle Inform-A-Gram No. B41.

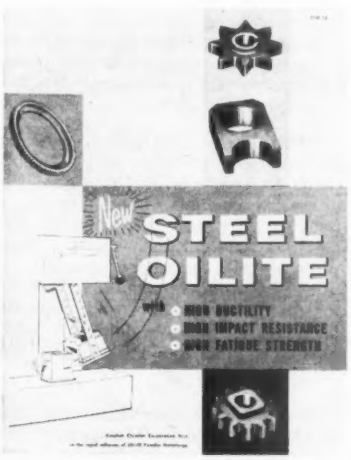
"Molykote" Microsize Lubricants are described in technical detail in Bulletin 104, available from the Alpha Corp., 65 Harvard Ave., Stamford, Conn. Featured is a graphic picturization of the relative particle sizes of molybdenum disulfide powders in relation to their ability to penetrate the crevices of ground bearing surfaces.
Circle Inform-A-Gram No. B42.

The Growth of Moore Special Tool Co. from a small tool and die shop to a prominent machine tool builder is traced in an attractive booklet now available from the company. Several new product announcements are made in the booklet, including that of a new form grinder. Get your copy from Moore, 740 Union Ave., Bridgeport 7, Conn.
Circle Inform-A-Gram No. B43.

Flexible Shaft Machines are described and illustrated in Franklin Balmar's Catalog No. C-210, which presents tabular data in easy-to-read form on the three basic types of Strand machines: single speed direct drive, multiple speed countershaft drive, and multiple speed gear-drive Strandflex line. Franklin-Balmar Corp., N.A. Strand Div'n, Woodberry, Baltimore 11, Md.
Circle Inform-A-Gram No. B44.

Precision Cleaning and Finishing is the subject of a comprehensive new brochure published by American Wheelabrator & Equipment Corp., 1183 S. Brykit St., Mishawaka, Ind. The 18-page booklet deals with the wet abrasive blasting process and presents 40 frequently-met applications in which this process can be profitably used, including extending tool life; producing satin, decorative, or two-tone finishes for sales appeal; reducing glare on metals; preparing metallic parts for anodizing, plating, painting, etc.; and cleaning and maintaining forming dies and molds. Ask for bulletin 541-D.
Circle Inform-A-Gram No. B45.

The New Sintered Material, "Steel Oilite," is discussed in a current folder offered by Chrysler-Amplex. Parts made of Steel Oilite have a high degree of ductility (10% or more) which is entirely new for sintered metal powder parts. Physical properties and numerous uses for the new material are listed in Bulletin STM-54, available from Amplex Div'n of Chrysler Corp., Detroit, Mich.
Circle Inform-A-Gram No. B46.



Precision Internal Gage. To explain the operation of the "Comtorplug," for high precision gaging quantity production holes, The Comtor Co., Waltham, Mass., has issued their Bulletin No. 48. In operation, this gage compares the work hole to a master reference ring the exact size of the desired hole.
Circle Inform-A-Gram No. B47.

Aluminum Products Chart. Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, Calif., announces the publication of a wall chart listing an extensive line of new aluminum products. Tabulations carry sizes, estimated weight per ft., lengths, and alloys. A conversion table from old to new alloy designations is also in the folder. The folder is designed for use as a wall chart, an insertion for a binder, or for filing.
Circle Inform-A-Gram No. B48.

Torque Testing Equipment and torque tools are shown in the complete, new catalog and price list now available from Richmont, Inc., 922 S. Myrtle Ave., Monrovia, Calif. An interesting section shows where Richmont torque tools are used in industry today.
Circle Inform-A-Gram No. B49.

5419

PRECISION GEARS

YOU who use small gears, (to 6" O.D. of the gear blank) can improve the performance of your product, through increased gear precision, without sacrifice of gear production.

YOU who use small, fine pitch, precision gears can increase your gear production without sacrifice of gear accuracy, or improve your gear accuracy without sacrifice of gear production.

The Hamilton Precision Gear Hobber, the hobber with a "reserve of accuracy," regularly holds work spindle and hob spindle runout to less than .0002", workspindle and tailstock spindle alignment to less than .0002", and this workmanship is maintained throughout the machine.

WANT FACTS?
Write for Bulletin No. 5419.
Address The Hamilton Tool Company
832 South Ninth Street,
Hamilton, Ohio.

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 1431

Cole Carbide Industries is offering a colorful file folder for holding reference material on the company's precision carbide cutting tools. The folder pictures the Cole plant facilities, products, and management team. Get yours from Cole Carbide Industries, Box 49, Royal Oak, Mich., or **Circle Inform-A-Gram No. B50.**

Breather Filters, "oil-wetted" and "oil-bath" types for engines, storage tanks, machinery housings, etc., are illustrated and described in a new folder from the Air-Maze Corp., 25000 Miles Rd., Cleveland 28, Ohio. **Circle Inform-A-Gram No. B51.**

Small Rolling Mills. A complete line of laboratory and production rolling mills, rotary gang slitters, levelers, and accessory equipment is shown in a new 4-page brochure available from Stanat Manufacturing Co., 47-28 37th St., Long Island City 1, N. Y. Although small in size, this precision equipment has all the rugged features of much larger machinery and is ideally suited to both laboratory research and regular production in metal processing industries. **Circle Inform-A-Gram No. B52.**

Choose INDEX MILLS

The Improved Low-Cost Machines that give you

GREATER VERSATILITY!
GREATER ECONOMY!
EXTRA CAPACITY!

You get more when you buy an Index Mill —more quality, superior features. You are not just buying a machine . . . You are investing in equipment that will deliver better results at lower cost. The ideal machines for all your

MILLING, BORING and DRILLING JOBS

Model 55 Vertical Mill

Outstanding in this great line is this versatile MODEL 55 VERTICAL MILL, designed for those extra capacity jobs often found in tool and die shops; provides increased speed and feed range. Capacity ⅛" to 1½" end mills in steel, a table working surface of 32" x 9" or 38" x 9"; overall 40" x 9" or 46" x 9".

MODEL 40 VERTICAL MILL
For speedy, economical milling. Spindle gives 9 speeds, 125 RPM to 2250 RPM. Easy to operate. Rugged, for every day operation; also used for boring and locating. Capacity ⅛" to 1" end mills in tool steel. Table working surface 8" x 26", 8" x 34" overall.

MODEL 60 HORIZONTAL MILL
Simple, efficient, compact, with all operating parts enclosed, yet readily accessible. Unusually low-priced. Designed for the average tool room, yet highly suitable for production shops through its rigidity and low maintenance cost. Standard table 40" x 9", larger table optional.

INDEX BUILDS BETTER MILLS . . . WRITE FOR LITERATURE

INDEX MACHINE CO.

541 N. MECHANIC STREET JACKSON, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1441

Carbide Blanks. The new 20-page Firth-Loach catalog describes all styles of standard and modified-standard blanks as well as rectangular strip, pulley grooving, and stone chisel blanks; unground inserts; heading die nibs, mandrel nibs, and nail die nibs; die inserts and special blanks and inserts. In addition, Catalog 1 illustrates the modern carbide plant and its production and laboratory equipment. Firth-Loach Metals, Inc., Buttermilk Hollow Rd., McKeesport, Pa. **Inform-A-Gram No. B53.**

New Carbide Tool Line. The Truman E. Longley Co., 4030 Superior Ave., Cleveland 3, Ohio, is now distributor for a new line of carbides carrying the Telco name. These carbides are made to rigid specifications by a leading carbide manufacturer and are available in all the standard tips and blanks of the industry, and are described in a catalog available from Telco. **Circle Inform-A-Gram B54.**

Multi-Purpose Work Holders in the Lassy Tool line provide low cost universal jigs and eliminate expensive single purpose fixtures. TOOLING & PRODUCTION readers can obtain a descriptive bulletin which illustrates a few of the many set-ups the Model P-2 work holder and standard accessories will make, from Lassy Tool Co., Plainville, Conn., or— **Circle Inform-A-Gram No. B55.**

"Fabricators to Industry" is a 20-page brochure marking the 30-year history and covering the diversified metal products of Pottstown Metal Products Div'n of Cochrane Corp., Pottstown, Pa. The handsomely prepared brochure describes and illustrates some of the tanks, pressure vessels, and process equipment the company has supplied for all phases of industry. **Inform-A-Gram No. B56.**

Centralized Lubrication Systems. Automatic application of fluid lubricants to bearings on individual machines at predetermined intervals is provided by new air-operated centralized lubrication systems. Complete details on these systems are given in brochure No. 806 from the manufacturer, Lincoln Engineering Co., 5702-86 Natural Bridge Ave., St. Louis 20, Mo. **Circle No. B57.**

Broaches. A complete catalog of du Mont "Minute Man" time and money saving tools has just been issued by The du Mont Corp., Greenfield, Mass. The catalog provides full information on the new stock line of high speed steel square broaches, in addition to data on broach kits, broaches, and bushings. **Circle Inform-A-Gram No. B58.**

Frederick F. Franklin has been appointed District Manager of the Cleveland office of the Vanadium Corporation of America. Formerly Assistant District Manager, Mr. Franklin succeeds Paul H. Shaeffer who has retired.

◆

The Indianapolis Office of the Cincinnati District of Kennametal Inc. is now the Indianapolis Branch, and **Frank Hull,** formerly a Representative in the Cleveland District, is Branch Manager. **George Sundell,** who has been a Service Engineer in the Buffalo area is moving to Indianapolis as a Representative.

◆

Chester F. Lenik, Application Engineer for Vickers, Inc., is in charge of the new Vickers branch office in Minneapolis. **Alan R. Wickham** is Manager-Application Engineer for the new Tulsa office.

◆

Appointment of **Levin P. Handy** as San Diego area Field Engineer of the Anaheim (Calif.) Division of Robertshaw-Fulton Controls Company has been announced by the company. Robertshaw-Fulton's Anaheim Division manufactures small precision control devices for the aircraft industry and the armed forces.

◆

The Pope Equipment Company in Cincinnati will handle the complete industrial and institutional lines of Nutting Truck and Caster Company's floor trucks, casters, and wheels, and other materials handling equipment in the Cincinnati territory.

◆

The appointment of **Arthur H. Van Wormer** as District Sales Manager in Cleveland was recently announced by Vickers, Incorporated, manufacturers of hydraulic products. The same company announces the reopening of a District Sales Office in St. Louis, with **Robert H. Mezger** as District Sales Manager.

◆

Jordan P. Freemantle has recently been appointed Sales Engineer for the Butterfield Division, Union Twist Drill Co., manufacturers of taps, dies, reamers, twist drills, counterbores, and milling cutters. Mr Freemantle will represent the Butterfield Division in the New York and northern New Jersey area, with headquarters in New York City.

Ralph B. Billingham, Jr., has been appointed Sales Manager of the Automation Section of the W. F. & John Barnes Co., Rockford, Ill. This section is engaged in the design and manufacture of a wide range of automation equipment including specialized conveyor units and systems for solving automation material handling problems.

◆

Hyrol Chemical Company, Chicago, manufacturers of water soluble cutting and grinding compounds has announced the appointment of **Robert E. Kellstrom** of the KELL-COmpany as their Detroit Representative.

Willard G. Hartman has been appointed Representative of the Continental Screw Company for the states of Minnesota, North Dakota, and South Dakota. Mr. Hartman will make his headquarters in St. Paul, Minn.

◆

The Wesson Metal Corp., Kentucky manufacturer of cemented carbides, announces the appointment of Edward F. Keating to the New England Sales Engineering Staff. Mr. Keating will work with tool fabricators and manufacturers on standard and special carbide metalworking application problems.

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CIRCLE INFORM-A-GRAM KEY NO. 1451

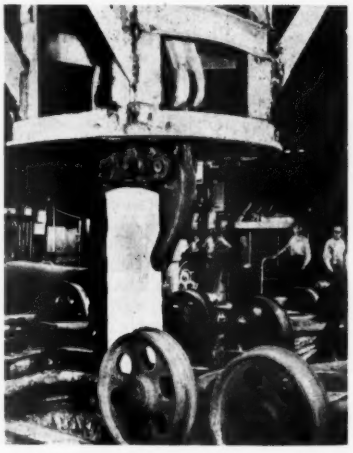
TITANIUM INDUSTRY REVIEW FOR 1954

by T. W. Lippert
Manager
Sales & Technical Service
TITANIUM METALS CORP.
OF AMERICA

After four years of struggling with metallurgical unknowns and obstinate production techniques, the producers and processors of metallic titanium in 1954 scored such encouraging gains as to assure a confident future. The 1954 production of basic metal more than doubled the 1953 figure. More important were the impressive improvements in quality, the significant reductions in metal processing losses, and the evolution of a firm and documented physical-metallurgy pattern which assures in 1955 and 1956 many new and very advanced alloys of exceedingly high strength and for high-temperature service.

Each of the two commercial producers of raw titanium sponge, Titanium Metals Corp. of America and E. I. du Pont de Nemours, achieved 10 tons-per-day capacity production by late summer. Compared with a 1953 output of 2250 net tons, total 1954 sponge production is estimated by Government agencies at 5250 tons, of which TMCA and du Pont contributed about 2500 tons each, the Bureau of Mines added 150 tons and other pilot units made up the remainder. Imports from Japan followed a rapidly rising curve by midsummer, the year's total being 250 tons, the major portion of quality metal originating in the Toho Titanium Co. plant at Chiagasaki City, Japan, a Mitsui enterprise.

The very sharp increase in sponge production late in the year brought about a seeming paradox of an over-supply of the material in face of repeated Government announcements that present and planned capacities are insufficient to meet requirements of the Air Forces alone. Actually, aircraft manufacturers cannot use titanium metal for any given application until assured of a sufficient supply to fill that application completely. Therefore, a sharp increase in production necessitates a temporary stock-piling of sponge by the Government such as that which occurred late in 1954. It is anticipated that all or part of the stock-piled sponge will be melted and converted during the coming year as additional applications are made in jet engines and airframe programs.



Four thousand pound titanium slab being removed from soaking pit for continuous rolling into 48" sheet.

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RUGGED CONSTRUCTION
Plus
DYNAMIC BALANCE
Plus
PRECISE ENGINEERING
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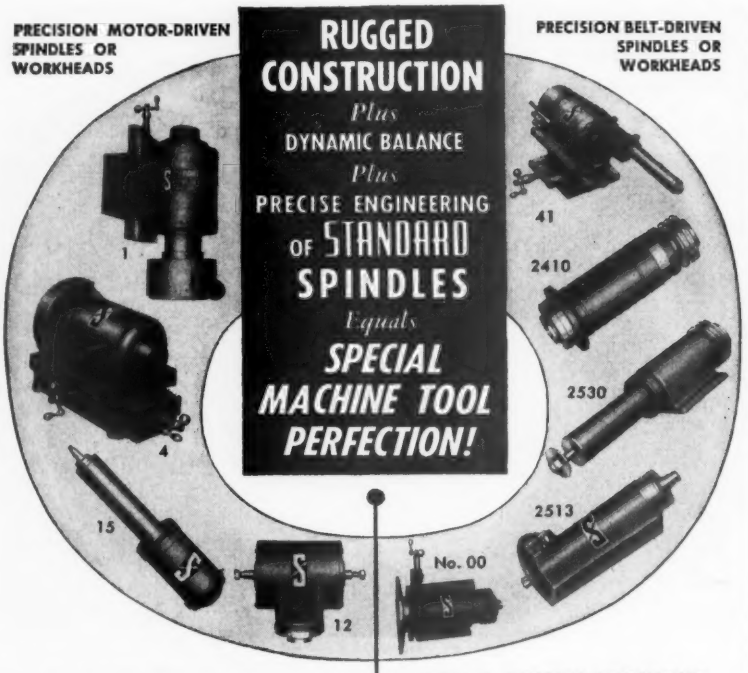
PRECISION BELT-DRIVEN SPINDLES OR WORKHEADS



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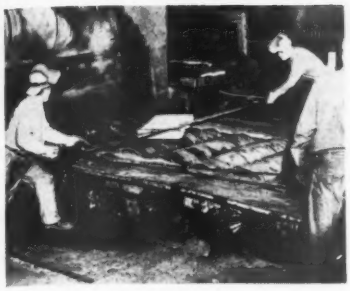
CIRCLE INFORM-A-GRAM KEY NO. 1461



Rolling titanium alloy armor plate.

The year was marked by substantial price mark-downs. In February TMCA led off with reductions in sheet, strip and plate which in certain grades and sizes amounted to 12% thereby establishing new market prices for those products. Lower market prices for bars and billets were set several weeks later when Rem-Cru Titanium, Inc. cut its prices for those products by as much as 14%. Sponge prices were also reduced during the years, initiated by du Pont. The price of sponge was reduced from $5.00 to $4.72 per lb on April 1, and further reduced to $4.50 on Dec. 1.

While all these reductions were decidedly encouraging for such an infant industry, many trade observers look for even more significant declines in 1955 if the industry can continue its fast production and development pace and fully exploit current pilot operations leading toward full recycling of scrap metal.

The drastic tightening and retightening of customer specifications throughout 1954 was reflected in a succession of production upheavals. However, industry sources do not anticipate much further burdensome and costly narrowing of specifications in 1955, for titanium mill products are today moving under customer limitations of a rigidity not to be duplicated in other structural metals having decades of production history.

For the past five years titanium sponge production has at least doubled each year, and some sources indicate a possible doubling again in 1955, or an output of 10,500 tons. More conservative estimates list a likelihood of about 8,800 tons in 1955, with the possibility of 15,200 tons in 1956 and 22,500 tons in 1957. The only new facility certain to contribute significant quantities of metal in 1955 will be Cramet, Inc., a Crane Co. subsidiary, which is constructing a 6000-ton-per-year plant at Chattanooga, Tenn., under a contractual arrangement with the General Services Administration. The Dow Chemical Co. plant, Midland, Mich., under G. S. A. contract for 1800 tons annually probably will come in with pilot quantities during 1955, but likely won't approach capacity operation until late 1956.

One of the most significant new entries into the production field in 1954 was the Electro Metallurgical Co. division of Union Carbide & Carbon Corp. which late in the year completed negotiations with the Government for a 7500-ton-per-year plant at Ashtabula, Ohio and has announced late 1957 as its target for full production. Horizons Titanium Corp. is building a small electrolytic pilot unit at Stamford, Conn., under a Government research contract; Kennecott Copper Corp. has announced the likelihood of a 3-ton-per-day semi-commercial plant; and

. . . *Continued on page 150*

NO SHERLOCK HOLMES IS NEEDED TO FIGURE OUT

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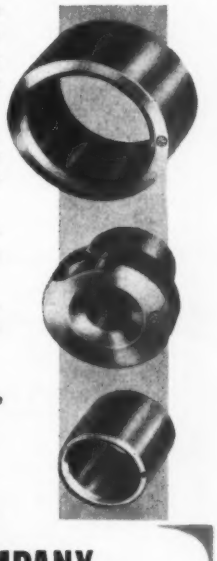

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CIRCLE INFORM-A-GRAM KEY NO. 1471

MEN YOU SHOULD KNOW

Edward M. Bancroft has been promoted to the post of Master Mechanic at Hamilton Standard, a division of United Aircraft Corp. **John E. Bateman** is now Chief Tool Engineer filling the post vacated by Mr. Bancroft.

◆

The J. C. Corrigan Co., Inc., Boston manufacturers of conveyors, have opened a sales office in New York City and **Gilbert Lavoie** has been named Sales Engineer in charge of the office.

Verle H. Erickson has joined Allied Metal Treating Corp., Kenosha, Wis., as Metallurgist and General Manager, according to a recent announcement from that heat treating firm.

◆

The appointment of **Carl Seguin** as Process Engineer in charge of cost reduction has been announced by American Thermometer Division of Robertshaw-Fulton Controls Co. Mr. Seguin who joined the company in 1952, was formerly in the tool engineering department.

Precision drilling and reaming requires bushings. When you are called upon to build or service a jig or fixture you need bushings right at hand. A shortage at a critical time can cause lost production.

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CIRCLE INFORM-A-GRAM KEY NO. 1481

The combining of the Air Appliance and Industrial Filtration Divisions of the U. S. Hoffman Machinery Corp. into the Industrial Equipment Division has been announced by Hyman Marcus, President of the company. **Revis L. Stephenson,** General Manager of the Air Appliance Division, has been promoted to the position of Vice President in charge of the new division.

◆

Roy Dehn has been appointed Director of Engineering of The Cleveland Crane & Engineering Co. This is a new position, created to integrate the engineering activities of the company. Mr. Dehn has been with Cleveland Crane since 1937 and was Chief Engineer of the Heavy Machinery Division. **Alfred W. Schultz** succeeds Mr. Dehn in that position.

◆

George N. Popham has been elected President and General Manager of the Gorham Tool Co., Detroit. Mr. Popham has been an active member of the cutting tool industry for the past 25 years. He served as Vice President and Sales Manager at Gorham during the past 13 years.

◆

The Board of Directors of Ex-Cell-O Corp., Detroit, have elected **Omer E. Robbins** as a Director to fill the vacancy on the Board created by the recent death of Leslie M. Johnston of Pittsburgh. Mr. Robbins organized Robbins Engineering Co., now a part of Ex-Cell-O, and served as its President until retiring from active duty in 1951.

◆

Behr-Manning Corp., Troy, N. Y., announces the appointment of **Edwin C. Evans** as Vice President and Assistant General Manager. Mr. Evans joined Behr-Manning in 1934 as a member of the sales analysis department. He later served as Purchasing Agent. **William I. Clark, Jr.,** has become Assistant to the President of Behr-Manning, in addition to his responsibilities as Secretary of the company.

◆

Goodloe H. Rogers, President and General Manager of the American Forging and Socket Co., Pontiac, Mich., has been elected President of the Automotive Parts Manufacturers Association. The APMA provides its members with pertinent information relative to the manufacture, sale, and service of products for the automotive and related industries. **Guy S. Peppiatt,** President of Federal Mogul Corp., is Vice President of APMA and **John W. Dixon,** Vice President of Clevite Corp., is Secretary-Treasurer.

MEN YOU SHOULD KNOW

Crobalt, Inc. announces the appointment of **John A. McDermott** as General Sales Manager. Mr. McDermott, a sales Engineer at Crobalt for the past six years, will now head the company's national sales activities on Crobalite hard-facing alloys and Crobalt cast-alloy cutting tools.

◆

Richard T. Myer has been appointed Chief Metallurgist of the aluminum fabrication division of Kaiser Aluminum & Chemical Corp. In this newly created position Mr. Myer will coordinate the metallurgical activities of Kaiser Aluminum's expanding Fabrication Division which includes sheet, plate, extrusion, rod, bar and wire, foil and forging production facilities, in providing technical assistance to industrial users.

◆

Appointment of **Andrew R. Wardrop** as General Manager of Ford Motor Company's Dearborn General Manufacturing Division has been announced by S. W. Ostrander, Vice President and Group Executive. Mr. Wardrop was formerly Assistant General Manager of the company's Metal Stamping Division. In his new position he will supervise the operation of four plants at Dearborn which manufacture machined parts, automotive sub-assemblies, glass and paperboard products.

◆

John Sheusner, Manager of Operations of the Enterprise Division of General Metals Corp., has appointed **R. E. Kroeck** to the position of Manager of Manufacturing and **B. A. Robbins** to the position of Manager of Engineering of the Enterprise Division. Mr. Kroeck has been with the company for 30 years, having served as Manager of Production Control and Purchasing Agent. Mr. Robbins started as a Material and Process Engineer at Enterprise in 1947.

◆

The appointment of **A. D. Moncrieff** as Manager of the machine tool and cutting tool divisions and **Clayton E. Scott** as Chief Engineer for Michigan Tool Company is announced by Oscar M. Bard, President. Mr. Moncrieff joined Michigan Tool in 1933 and served as Assistant Chief Engineer from 1943 to 1953. He has been on special executive staff assignments for the last year. Mr. Scott joined the firm in 1935. He was appointed Assistant Chief Engineer in 1953. **Charles R. Staub,** Chief Engineer at Michigan Tool Company since 1936, has been named Staff Consultant. Mr. Staub pioneered in the development of modern gear production methods and machines.

E. J. Weller, carbide design and application engineer at the Carboloy Department of General Electric, has been named Manager of Tool Sales at Carboloy. He began as an apprentice machinist at G.E. in 1937 and joined the Carboloy Department in 1954.

◆

Hjalmar A. Anderson was recently appointed Chief Project Engineer of Lindburg Industrial Corp., Chicago. He is in charge of industrial furnace, special machine, and production line equipment design.

Niles-Bement-Pond Company announced recently the election of **John C. Molinar** as Vice President of the Company and his appointment as General Sales Manager. Mr. Molinar will be responsible for domestic and foreign sales activities as well as the activities of the Advertising and Market Research Departments. At the same time, announcement was made that **James D. Allan,** will direct the Machinery Sales of all Divisions of Niles-Bement-Pond.

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MODERN Industrial Engineering Co.

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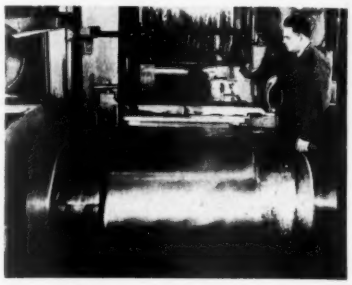
CIRCLE INFORM-A-GRAM KEY NO. 1491

. . . Titanium, from page 147

there are rumors that Britain's Imperial Chemical Industries (which is constructing a 1500-ton-per-year plant in England) intends to construct a facility in the United States, possibly in affiliation with a yet unnamed American company.

The General Services Administration has under active consideration a second contract with the Titanium Metals Corp. of America for an additional 5400 tons per year at Henderson, Nev., and with E. I. du Pont de Nemours for an additional 7200 tons per year near Waverly, Tenn., and has under preliminary negotiation contracts totalling 20,000 tons per year with other interested and capable firms.

On the technological front, no new or particularly significant technique for producing the basic sponge metal has made its appearance. However, both the Electro Metallurgical Co. and Imperial Chemical Industries have attracted considerable attention by reverting to a modification of the original method of producing metallic titanium, using sodium to reduce the tetra-



Cold rolling 36" titanium strip sheet.

chloride, as against the magnesium (Kroll) reduction of the tetrachloride as practiced by TMCA, du Pont and Cramet. The only fully-integrated facility operating or in the planning stage is Titanium Metals Corp. of America, which carries ore through the entire productive sequence to finished mill products, and is unique in that it recycles the by-products of reduction, i.e. chlorine and magnesium. In the melting of titanium sponge, the double-melting and vacuum-melting techniques, announced early in the year by TMCA, are apparently becoming standard practice throughout the industry.

That this new structural metal has so quickly attracted so many blue-ribbon American industrial firms into heavy technical and financial commitments is in itself a massive vote of confidence in titanium's unique high strength with light weight and superior corrosion resistance. These are properties much in demand by the civilian economy, and in particularly immediate demand by military contractors. For, as announced late in the year by the office of the Assistant Secretary of Defense: "We believe that the successful development and engineering application of titanium in this country will represent a major technological break-through. It opens up the possibility of military designs, with performance characteristics that would be impossible of attainment with other known materials and could have an important bearing on the outcome of our technological race."

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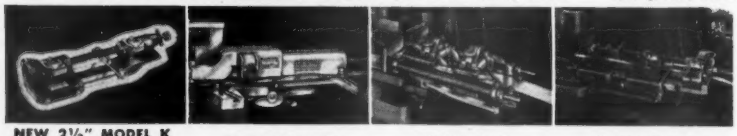

NEW 2½" MODEL K HITCH FEED® | 9" ROL-DI-FEED | 6" DIE FEED | 4" HITCH FEED

CIRCLE INFORM-A-GRAM KEY NO. 1501

GROWING PAINS

A major addition to its manufacturing plant has been completed by **Detroit Die Set Corporation,** Detroit, in order to increase production capacity for both special and stock die sets.

◆

Plans to build new jet engine research and development facilities costing more than $12½ million have been announced by **Westinghouse Electric Corporation.** The new facilities, which include both high and low-power laboratories and an experimental engineering shop, will be located at the present site of the company's jet engine plant south of Kansas, City.

◆

An "Open House" for employees, customers, suppliers, and friends of **Michigan Drill Head Co.** marked the recent completion of the company's new plant in Van Dyke, Mich.

◆

Valenite Metals Corporation, new carbide producer, announces the completion of its new plant on Stephenson Highway in Royal Oak, Mich.

◆

The application engineering department of **The Bristol Co.,** Waterbury, Conn., has just moved into a new office building addition. Work is nearing completion on an expansion of the manufacturing plant of the same instrument and socket screw manufacturing company.

◆

Establishment of a branch of the company's Stainless Processing Division in Morrisville, Pa., is announced by R. L. Peaslee, Vice President of **Wall Colmonoy Corp.** The plant will provide manufacturers on the East Coast with contract brazing and heat treating facilities for stainless steel alloys and aircraft components.

◆

The Cleveland Crane & Engineering Co. has begun the erection of a plant in Los Angeles to house office, warehouse, and manufacturing facilities. The building will be occupied jointly by Cleveland Crane and **General Conveyor, Inc.,** their California Cleveland Tramrail distributor, and will greatly expedite deliveries of Cleveland materials handling equipment throughout the West.

Sinclair-Collings Valve Company and **Valvair Corp.** announces the opening of a new plant in Canton, Pa. The new plant will operate under the manufacturing name of **Collins Valve, Inc.,** and will be a main production center for the eastern customers of Valvair and Sinclair-Collins.

◆

Wesson Metal Corporation has completed its ultra-modern, 40,000 sq. ft. cemented carbide metals plant in Lexington, Ky. The plant doubles Wesson Metal's productive capacity and also expands the company's research and development facilities.

The opening of a new warehouse and office in Los Angeles has just been announced by **Henry Disston & Sons, Inc.,** 114-year-old manufacturer of saws, tools, and alloy steels.

◆

Latrobe Steel Company announces the opening of its new Cleveland branch office and warehouse. Modern warehouse handling equipment and order procedures, including teletype communications with eight other Latrobe warehouses and the mill at Latrobe, Pa., will enable this branch office to process customers' orders with greater efficiency than ever before.

A NEW CONCEPT!

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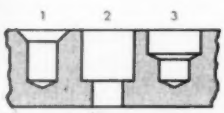
Size-Optional

SUBLAND

Believing that there is too great a void between standard and special tooling, Mohawk has designed and developed a semi-standard subland tool.

The Mohawk Size-Optional Subland is machined, hardened and placed in a stock bin. This results in a material saving to the customer in set-up costs, reduces delivery time to a fraction of that usually required for special tools, and allows a tremendous reduction in inventory. In ordering these Size-Optional Sublands, the customer is limited only in relation to shank specifications, and partially on overall length requirements. Diameters and step lengths are completely optional to fit the particular application. Write for full details.



SUBLAND DRILL (2-2)
(1) Drill—Chamfer
(2) Drill—Counterbore
(3) Drill—Drill

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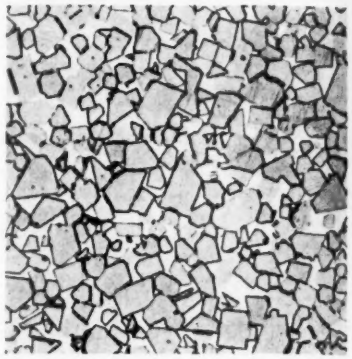
CIRCLE INFORM-A-GRAM KEY NO. 1511

FIRTH STERLING CHECKS 20,000TH CARBIDE SAMPLE

Recently Firth Sterling's Metallographic Department, an important part of quality control, completed examination of their 20,000th sample of tungsten carbide since the laboratory was moved three years ago from the McKeesport plant to new facilities in Pittsburgh.

The carbide specimens come to the laboratory after having been checked first for mechanical properties in the quality control department of the Carbide Division, located in McKeesport. In the laboratory at Pittsburgh, the samples are mounted in Bakelite, ground and polished to a high, mirror-like finish for examination under the microscope. Metallographic examination for porosity is checked at a magnification of 200 diameters. The specimens are then etched in various reagents and examined at 1,500 diameters for structural constituents, segregation, size of carbide particles, and possible impurities in the material. To facilitate quality control, the laboratory is equipped to do highly specialized types of color, as well as black-and-white metallography. Firth Sterling was the first in the carbide field to develop color metallography, a heat-tinting technique which makes possible the identification of constituents in multicarbide mixtures, not detectable through black-and-white metallography.



Tungsten carbide sample — 1,500 magnifications.

In addition to this extensive work in quality control, Firth Sterling's metallographers aid the company's research metallurgists in determining structural qualities of specimens resulting from new product research, such as cermets, chromium carbides, and new tungsten carbide grades.

1. **Increased Production.** Pope Spindles speed up output because they can take heavy cuts.
2. **Increased Wheel Life** because the shaft is rigidly supported by bearings of ample size.
3. **Super Precision Bearings** made to Pope specifications and used exclusively in Pope Spindles.
4. **Better Finished Ground Holes.** Pope precision craftsmanship assures work of the highest standard.
5. **Operating Time Saved.** One motor pulley serves all spindles except in unusual applications.
6. **No Additional Lubrication** is ever required. Thirty years of wide factory use has proven the ability of the Pope System of Sealed-in Lubrication to prolong bearing life, reduce maintenance costs and provide cool operation.
7. **Dynamic Balance.** Pope Spindles are dynamically balanced with all their rotating parts in full assembly to insure smooth running.

Pope Precision Internal Grinding Spindles come in the sizes, shaft extensions and speeds (up to 35,000 RPM) to meet your every need.

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BUILDERS OF PRECISION SPINDLES

CIRCLE INFORM-A-GRAM KEY NO. 1521

SWING-TABLE BLASTING MACHINE

Distinct from other swing-table airless blasting machines, a recently developed machine requires no pit for the abrasive hopper.

This machine is designed to handle a wide range of cleaning, peening, deflashing, and materials finishing preparation.

The most important feature of this machine is the large diameter plain work table which is mounted on the machine door. When the door is opened the work table comes out into the room for ease of loading and unloading. When the door is shut, the table automatically moves into the blasting zone of the ma-

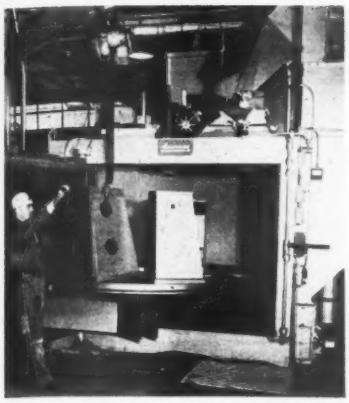


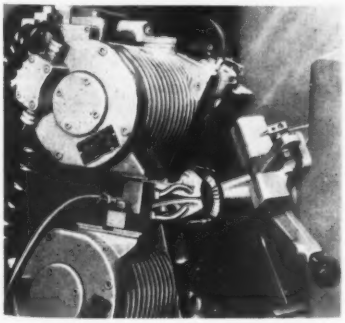
Photo courtesy American Wheelabrator & Equipment Corp.

chine and rotates the work under the abrasive blasts from a rotating, bladed wheel mounted in the cabinet roof. Centrifugal force alone propels the abrasive, with no compressed air needed.

A special feature of the machine is the provision of auxiliary tables for use when advisable. These can be loaded with workpieces and then lifted by lift truck or jib crane onto the revolving table; thus, while a load of work is being cleaned, another auxiliary table can be loaded for the next cycle. In this manner machine downtime is held to a minimum.

New Grinder For Straight Bevel Coniflex Gears

Straight bevel Coniflex gears are automatically produced with the new high speed wet-type



grinder by the Gleason Works of Rochester, N. Y.

Two disc-type grinding wheels on the No. 105 grinder produce gears up to 8½" pitch diameter, 1⅜" face width, and 3 DP. The grinding is done on the flat sides of the wheels (as shown), and the tooth profile shape is generated by a relative rolling motion between the gear blank and the grinding wheels.

Once the gear is chucked in the workhead, the entire grinding cycle of the No. 105 is entirely automatic, including the correct number of passes, in-feed of the work, and dressing of the wheels at pre-selected intervals.

Fine pitch gears are ground directly from the solid blank. Coarser gears are ground after cutting and hardening. Since the gear teeth are finished after hardening, the problem of heat treating distortion is eliminated, and it is possible to produce hardened straight bevel gears with new higher limits of accuracy.

Gleason Works, 1000 University Ave., Rochester 3, N. Y. will supply additional information.—**Inform-A-Gram No. D1.**

THE STUDER PSM-250
GRINDS PROFILES UP TO 16"
IN ONE SETTING
LARGER FLAT OR CIRCULAR FORM TOOLS, SECTIONAL DIES, GAUGES AND OTHER PROFILE PARTS CAN NOW BE ACCURATELY GROUND ON THIS
NEW STUDER
PROFILE GRINDER
INCREASED CAPACITIES
The PSM-250 grinds profiles up to 16" long in one setting and accepts flat work pieces up to 4½" thick and rounds up to 10" diameter. Templates up to 24" long are easily accommodated. The adjustable pantograph can be set in any ratio from 1:1 to 1:10.
CLEARANCE ANGLE AND RELIEF GRINDING
Attachments are available to grind different clearance angles on flat form tools—without correcting template form; and, to relief-grind punching and drawing dies.
AUTOMATIC TRACER GUIDE
This attachment automatically guides tracer bar along the template. The automatic, uniform feeding produces improved surface finishes and increases the life of grinding wheels. To guide tracer bar by hand, two screws are loosened to detach the device.
PRECISE GRINDING
Profiles can be ground to a tolerance of ± 0.0004". Closer limits are obtainable when large ratios of reductions are employed
WRITE FOR CATALOG ILLUSTRATING AND DESCRIBING THE NEW STUDER PSM-250
COSA
nationwide sales and service of precision machine tools
—from bench lathes to boring mills.
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1531

Die Life Improved by Change in Design and Heat

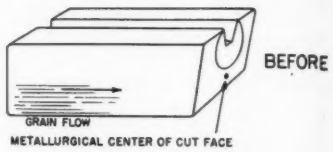
The Railway Accessory Department of Inland Steel Company was experiencing extremely short life with the dies used in the production of railway spikes.

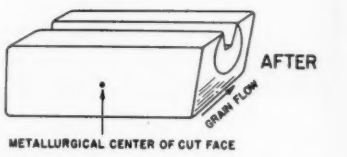
The dies, which received heat treatment in the conventional manner (hardened and tempered) were made of low carbon, molybdenum high speed steel.

Life of the dies was inconsistent. Complete failure (breakage) often occurred after producing as few as 50 or 75 kegs of spikes . . . while other dies lasted for hundreds of kegs.

Engineers of Inland Steel Company, tool steel suppliers and Lindberg Steel Treating Company cooperated in attempting to solve the problem.

Investigation revealed the dies were made from bar steel in such a manner that the grain flow was parallel to the direction

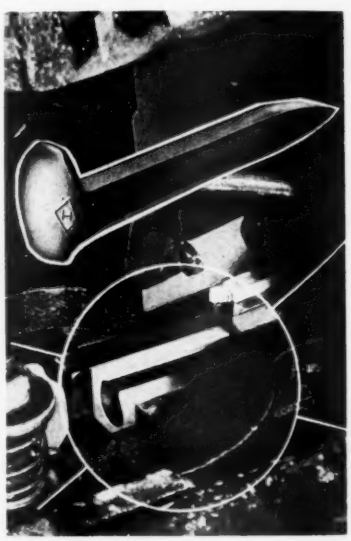




of the principal applied stress.

It was also established that the principal stress was directed against the metallurgical center of the bar. Both of these conditions, it was felt, contributed to poor die life. Therefore both were corrected by using a wider bar and machining the dies transversely therefrom.

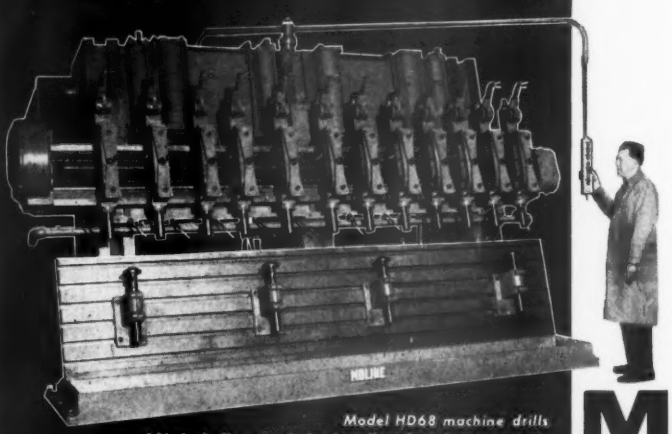
This change in the method of machining the dies resulted in improved life. However, the improvement was not sufficient and further investigation concerning the failures was necessary.



The principal cause of failure was heat checking which eventually led to complete breakage of the dies. Once heat checking started, the network of cracks acted as notches promoting rapid fatigue type failures.

On the basis of the prevailing experience, it was decided to try carburizing the dies in order to produce a tough core and a hard case, the latter providing com-

FOR GREATER · · ·



Model HD68 machine drills 1 1/2 inch diameter holes in railroad track components.

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104

MOLINE TOOL COMPANY
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CIRCLE INFORM-A-GRAM KEY NO. 1541

pressive stresses on the surface which would tend to minimize the propagation of the heat checks after they formed.

The following treatment was developed and applied to a substantial quantity of dies:

1. Pack carburize in charcoal at a temperature of 1850°F. to produce a case depth of 0.032-0.045".
2. Quench in oil and triple temper to produce a hardness of 58-60 Rockwell "C" on the case.
3. Blast with sand or steel grit after heat treatment.

The redesign of the die plus the change in heat treatment was definitely successful according to C. E. Chapman, superintendent of Inland Steel's Railway Accessory Department.

15 Grinding Wheel Economies

In the course of a talk before the Western New York Chapter of the American Foundrymen's Society, K. S. Cowlin of the Electro Refractories & Abrasives Corp., suggested fifteen possible means of economizing in heavy grinding operations. They are:

1. Select wheel hardness compatible with good grinding costs.
2. Use of thinner wheels in certain applications. They may do the same amount of work.
3. Maintain surface speed through speed changes or additional machines to use partially worn wheels.
4. Take advantage of large hole allowances in resin wheels. It might pay to install adapter flanges.
5. Use of a template for measuring worn wheels before removal.
6. Substitute an aluminum oxide wheel for silicon carbide in a non-ferrous foundry or where grey iron or hard malleable is to be ground.
7. Where portable cups are used, a wider rim for the same price or a straight sided cup might be practical.
8. Sometimes a dual specification wheel can be used effectively, but the advantage must be weighed against the cost.
9. Use a magnetic chuck to hold steel castings while swing grinding. Reduced vibration may cut wheel cost.
10. Hard-sided wheels at a slightly higher cost might be justified for grinding brake shoes and other castings where work is mostly corner grinding.
11. Employ wheels which have been treated with materials such as wax, particularly on brass and aluminum. The added charge for treated wheels prove worth while.
12. Unless castings have some dressing action, occasional dressing of wheels can be economical and a safety measure.
13. Wheel truing also adds to safety and restores normal contours of worn wheels.
14. Where large vitrified wheels are used, investigate the advisability of converting to resin wheels for increased operating surface feet per minute and a tougher wheel.
15. Use largest practical wheel diameter. Large wheels require less frequent truing and the cost per cubic inch of wheel wear is less than smaller wheels.

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24 HOUR DELIVERY!
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Send for complete catalog and prices.
CIRCLE INFORM-A-GRAM KEY NO. 1551

Flat Lapping is Now Being Done in a Single Pass

A single-face, flat-lapping machine with semi-automatic feed has been designed for continual lapping and for the complete lapping or work in a single pass around the lap. The result is more pieces per hour than were possible on former machines.

Success in lapping in a single pass is due to the greater efficiency of bonded abrasive laps over cast iron laps. Cleaner work surfaces, free of imbedded or entrapped grit, is another advantage of bonded abrasive laps. Grit is washed away by the stream of filtered coolant on the lap. Because of this, there is no necessity for stopping the operation to clean the laps. Lapping is interrupted only to true the laps, the truing being done by a diamond held in a variable speed, power-operated truing arm.

A work pressure arrangement

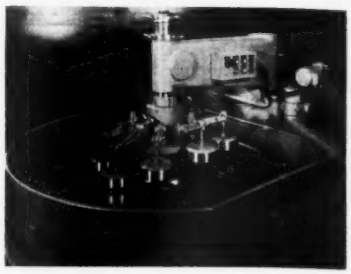


Photo courtesy of Norton Co.

automatically applies the proper weight to the parts grouped in each work-holder, to secure the desired lapping action. This arrangement lifts the weights clear as they pass through the loading station to permit loading and unloading. The weights are then applied to the newly loaded pieces as they are moved out of the loading area.

In normal operation, the operator merely loads with his right hand and removes with his left. The machine can be arranged for automatic continuous operation by the addition of suitable loading and unloading devices.

MAKES BROACHING PRACTICAL — *for any plant large or small*

• Now, with the new ACME FLEX-O-BROACH, a small, inexpensive, self-contained HYDRAULIC BROACHING MACHINE and PRESS UNIT, you may do HORIZONTAL BROACHING . . . VERTICAL PULL-DOWN BROACHING . . . PUSH BROACHING . . . FORCING . . . STAKING . . . ASSEMBLING . . . CRIMPING and GENERAL PRESS WORK. This unit may be changed from horizontal position to vertical position in a matter of minutes and is low in initial cost and offered to fill the need for highly Universal equipment in connection with secondary operations or for the Job Shop and short production runs not justifying expensive equipment and tooling.

WRITE FOR CIRCULAR AND COMPLETE SPECIFICATIONS

ACME BROACH CORP.
MILAN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1561

Trunnion Fixture Simplifies Radial Drill Jobs

Work may be drilled in various planes with a single-clamping—in a simple, home-made, trunnion fixture for radial drills. At the DeLaval Steam Turbine Co.

in Trenton, N. J., this fixture has cut setup time, simplified work-holding problems, and improved the accuracy of drilling on many parts.

Shown here is a pump cover mounted to the jig plate in the trunnion fixture and located on the pump cover face into which

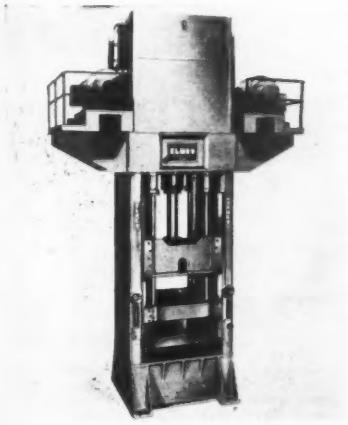
drilling is required. Work of this kind would be difficult to locate accurately in any other way.

The fixture, made in the De-Laval machine shop, consists of a bed mounted on two A-frames that may be clamped at any point along the bed. An index plate, shaft-connected to a worm-gear drive, is mounted on one A-frame. Index holes at desired intervals are jig bored and bushed. A spring-actuated index pin locks the index plate for drilling at the required angle. A side-plate attached to the index plate and a matching side-plate on the tailstock A-frame are adjustable for height.

Jig plates are made in standard sizes to fit the trunnion fixtures. With the addition of an index plate to the jig plate, any compound angle can be obtained.

Multiple-Ram Press Offers Rigidity, Power And Accuracy

The newly-designed Elmes Hydraulic Drawing and Forming Press is a double-action unit equipped with die cushion. The multiple ram, moving-down press has pre-shrunk tie rods to assure maximum rigidity and alignment. Guide ways for the slides are of hardened steel, affording increased wear resistance and protection against scoring. Hand-scraped gibs make close-tolerance gib adjustments possible with the resultant maximum maintained lubrication and corresponding increased life of the ways.



The multiple-ram arrangement permits maximum flexibility of operation, for greater pressing speeds are available for work requiring less than maximum press tonnage. For single-action operations of blank-holder and main platen, the respective capacities (blank-holder, 100 tons; main platen, 300 tons) are combined to obtain a total capacity of 400 tons.

Floor-level pushbutton controls permit the operator to make adjustments while the press is in action and to observe the position of the ram while making adjustments. A manual, hydraulic bleed-off type inching control makes it possible to control the slide movement in die setting to within a few thousandths of an inch.

Elmes Presses are products of the Elmes Engineering Div'n, American Steel Foundries, 1150-Y Tennessee Ave., Cincinnati 29, Ohio.

Circle Inform-A-Gram No. D3.

CUT TOOLING COSTS . . . SPEED PRODUCTION
with fast, accurate, efficient
MAX-WELL MADE
Boring and Recessing
TOOLS

JF RECESSING TOOLS
For use with jig or fixture on automatic or manual feed machines. Precision grooving, necking, undercutting, inaccessible spot facing. Five sizes to pilot into 1" to 2¼" drill bushings. Accurate to within ± 0.001-inch. Interchangeable shanks.

DB RECESS-O-MATIC
Designed especially for use on multiple spindle automatics for all precision internal forming operations. Three sizes. Maximum capacities 2", 3" and 4". Recessing stroke range from ¼" to ½".

MASTUR BORING TOOLS
Three sizes. 3-Position boring bar. Maximum boring bar capacities of ½", ¾" and 1". Boring range from ⅜" to 15". Adjustable to 0.0002-inch. Morse or B&S shanks.

R RECESSING TOOLS
Precision built for sustained recessing, grooving and backfacing operations. Quickly adaptable to any manual feed machine. Four sizes for ⅜" to 4" holes.

E-Z SET BORING TOOLS
Three sizes. 3-Position boring bar. Maximum boring bar capacities of ½", 1" and 1½". Boring range from ¾" to 20". Adjustable to 0.0002-inch. Interchangeable shanks.

Write for Literature on Maxwell Boring Tools, Recessing Tools, Boring Bars and Cutters

1150 MC

THE MAXWELL COMPANY
250 BROADWAY • BEDFORD, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1571

THE FABRICATION OF ZIRCONIUM*

ONE OF THE LESSER known metals but one of the few that metallurgists believe will play major roles in expanding our technological horizons during the next decade, is the relatively new metal — **Zirconium.**

This metal has exceptional resistance to a wide range of chemical corrosives — badly needed in several industries. It also has the currently vital property of "low neutron absorption" — meaning that this quality in combination with its many other very good properties makes zirconium a prime target as a structural metal for atomic reactors.

Brinell Hardness versus Percent Reduction

Material	Percent Reduction					
	0	20	40	60	80	90
Plate Zr	165	204	210	215	228	255

Cold Working

Zirconium work-hardens quite rapidly during cold working as indicated in above table.

Zirconium may be cold rolled with reductions per pass of less than 10% and with permissible reductions of 35% or more between anneals.

Zirconium sheet can be slit and blanked with conventional equipment. Deep drawing of cans is accomplished using a lubricant of electroplated copper or commercially available adhesive type cements. An oxide film is necessary to hold non-metallic lubricants. Cans 8" long by 1" diameter with a wall thickness of approximately 0.015" have been drawn from zirconium using intermediate anneals at 650° C (1200° F) in a 50:50 lithium carbonate-potassium carbonate bath and commercially available waxes as lubricants.

Extruding and Deep Drawing

Normal extrusion of zirconium has been limited by lubrication difficulties. Good lubrication is essential to prevent welding of metal to the dies. Oxide films reduce the tendency to gall and seize but on the other hand tend to abrade the die surfaces. Tungsten bearing hot work tool steels have generally been used as tooling materials. The basic lubricants have been heavy oil suspensions of flaked graphite, molybdenum disulphide, or mica. Thin copper plates or sheathings have been successfully applied to present a non-galling surface to the die walls.

Tube and Rod Fabrication

Tubing may be drawn from extruded tube using molybdenum disulphide lubricant or by tube forming from strip and seam welding in a protective atmosphere.

Rods may be produced by extrusion or forging followed by cold swaging or drawing. Intermediate anneals are required for

*Reprinted from "Facts About Zirconium" by permission of The Carborundum Metals Company, Inc., Akron, N. Y., and The Carborundum Company, Niagara Falls, N. Y.

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AUTOMATION
OFF SHELF DELIVERY!
T-J
Spacemaker
CYLINDERS
★ OIL pressure to 750—AIR to 200 P.S.I.
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Compare feature by feature—you'll see why T-J Spacemaker Cylinders are today's top choice for streamlined power movement in automation! The only cylinder with all the extras as standard. Write for bulletin SM-454-2. The Tomkins-Johnson Co., Jackson, Mich.
CIRCULAR HEADS WITH TIE RODS
SQUARE HEADS WITH TIE RODS
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SPACE SAVED
T-J SPACEMAKER provides additional room for adjacent equipment without sacrificing strength
T-J TOMKINS-JOHNSON

CIRCLE INFORM-A-GRAM KEY NO. 1581

Kroll zirconium at approximately 790°C (1450°F) after 35% cold reduction.

Annealing

Stress relief annealing after cold working is obtained by heat treatment at temperatures and times dependent upon the amount of cold work the metal has undergone. Short treatments of about 10 minutes in air at temperatures above 500°C (932°F) will soften the metal. Complete annealing is obtained on recrystallization by heating for about one hour at 850°C (1562°F) or for shorter periods at higher temperatures. To avoid serious oxidation at these temperatures, treatment would have to be done in a vacuum or a pure inert gas atmosphere.

Generally a temperature of about 650°C (1202°F) is used to anneal metal being worked. Short periods at this temperature produce appreciable softening without much oxidation, the time of treatment depending upon the section thickness. Thin sheets require about one minute at temperature whereas thicker sections may be annealed in air at 700 to 850° (1292 to 1562°F) for periods up to 10 minutes at temperatures necessary to restore the crystalline structure after hot rolling.

Contamination of the metal by the atmosphere for these short periods may be ignored, but light sections should be annealed in vacua or inert gas atmospheres.

Welding

Ductile welds may be obtained using inert gas shielding techniques with either tungsten electrodes or a consumable electrode of zirconium wire. Direct current welding gives welds superior to those produced by alternating current, especially in thin sheet of the order of 0.030" or thinner. When welding thin sheets it is essential that protection from oxidation be provided on both the upper and underside of the weld. For thicker sheets more complete protection is required and welding should be performed in a gas tight box under slight pressure of argon, preferably argon that has been purified.

For applications involving corrosive atmospheres welds may be tested in hydrochloric acid containing 1 gram per liter of iron to intensify the corrosion. Properly made welds should withstand attack from this solution as well as or better than the parent metal.

Brazing and Soldering

Joints having strengths approaching that of the brazing alloys used may be produced using suitable furnace brazing techniques. Both silver and copper may be used as a brazing metal. To prevent oxidation of the zirconium high vacuum or purified argon atmospheres must be used. The amount of brazing metal must also be controlled such as by inserting suitable shims into the joint.

It is claimed that conventional brazing techniques may be accomplished by first tinning the surface of the zirconium and then brazing or soldering. One method of tinning that has been described entails dipping the zirconium through a flux of molten cuprous chloride into silver sol-

. . . *Continued on page 162*

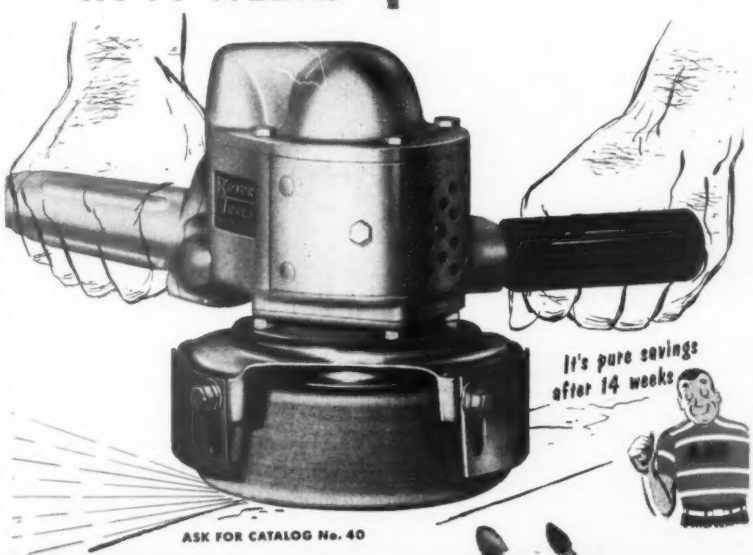
NEW
Rotor B-35
Vertical
Air Grinder
PAYS FOR ITSELF
IN 14 WEEKS

Job: Grinding surface defects on castings. Formerly used 3600 rpm electric grinders.

Now: Rotor Application Engineer suggested switching to new Rotor B-35 Vertical Grinder at 6000 rpm with a harder wheel.

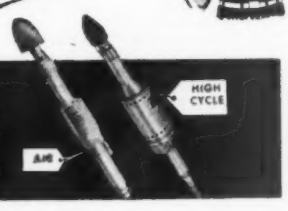
Results: Saves 8 minutes per casting . . . 40% more output with 60% use factor. Savings paid off tool in 14 weeks. Wheels last longer. Cuts operator fatigue.

See how *you* can step up output with new Rotor tools! Ask for demonstration on your job.



ASK FOR CATALOG No. 40

THE ROTOR TOOL CO.
CLEVELAND OHIO



CIRCLE INFORM-A-GRAM KEY NO. 1591

SIMPLICITY IS BUILT INTO NEW ANGULAR GRINDER

A new semi-automatic, angular wheel slide, grinding machine rapidly grinds thrust surfaces and adjacent diameters simultaneously in a single, automatically controlled plunge grind. It cuts grinding costs by eliminating the separate operation normally necessary when similar jobs are done in conventional cylindrical grinders. Furthermore, the machine produces a concentric grain pattern in the finish of the shoulder or thrust surface ground.

Faster sizing qualities and simplified operation are built into the CV-4 machine. Fast, accurate sizing comes from the feeding efficiency of the CTU-type wheel feed mechanism with its hydraulically rotated, micrometer-screw feed. This mechanism also includes a "click-count" index, with which settings for work diameter reduction in increments as fine as .0001" are made instantly and without visual attention.

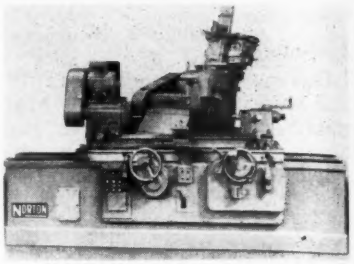


Photo courtesy Norton Co.

Normal operation of the machine requires three simple actions. The operator (1) loads, (2) touches a "one-lever" control — which starts the automatic grinding cycle, work rotation, and coolant flow, and (3) removes work — at the automatic, electrically controlled termination of the grind. The ease of these movements reduces operator fatigue.

Although wheel wear compensation is not an integral feature of the new machine, it is available as extra built-in equipment.

The machine takes heavier work loads and performs roughing or the finest finishing operations with equal facility. Its heavy wheel spindle unit with standard full-round, long spindle bearing construction is an outstanding aid in precision work because of its extreme resistance to grinding pressures.

Advantages that promote economy in maintenance are also built into the machine. The coolant tank has a ramped outlet for easy clean-out; pumps and motors are external; and electrical controls are grouped in an enclosure. Electrical and hydraulic equipment conform to J. I. C. standards.

SHELDON

Sheldon's larger, wider "Zero Inspection", Tapered Roller Spindle Bearings save you money by making these lathes better in 6 ways.

Write for G-35 catalog showing new 10" 11" and 13" swing, bench, cabinet and pedestal mounted Sheldon Precision lathes.

1st They *meet* Sheldon's high standard for accuracy—each bearing has a run out limited to .00015"

2nd They absorb thrust and radial loads beyond requirements—basic rating on front bearing at 500 R.P.M.
for radial loads.....3540 lbs.
thrust loads.....2335 lbs.

3rd They *end* costly bearing maintenance—require only a fractional turn of bearing take-up after long periods of service.

4th They *hold* the spindle in rigid alignment while permitting it to turn freely at high or low speeds—the line contact between rolls and races, and the opposing taper design, preclude lateral movement or end play.

5th They *minimize* friction—smooth mirror finished rollers and races running in light oil, deliver more horsepower at the Spindle Nose and lower power costs.

6th They *increase* work capacity. Larger than similar type bearings on other lathes in this price range, these bearings make it possible to turn out *more work* and *better* work at lower costs.

SHELDON MACHINE CO., INC.

4235 NORTH KNOX AVE., CHICAGO 41, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1601

WELDING WITHOUT OPEN FLAME OR ARC

Welding metal to glass, metal to porcelain, as well as metal to metal is now accomplished without open flame or arc. Unusual strength and ease of handling is being experienced by use of "Tygoweld", an organic welding material recently developed.

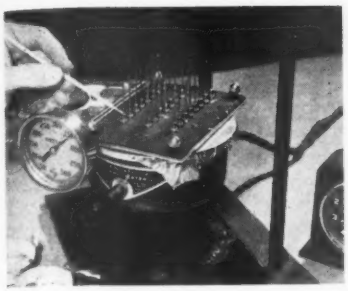


Photo courtesy U. S. Stoneware Co.

"Tygoweld", new organic welding material is being flowed onto hypodermic needle connectors. Strong and corrosion-resistant joint is obtained without use of torch or arc.

This material comes in rod, powder or paste form and can be applied with moderate heats and little or no pressure. Storage problems and "aging" are virtually eliminated by the rods. Special color and filleting characteristics further widen the range of its possible applications.

"Tygoweld" has been subjected to tensile strength tests where over 4,000 psi has been applied to standard lap shear specimens with only ½" overlap. Peel tests show equally good holding qualities. Other tests have shown the welds to be resistant to corrosion from oils, fats, acids and all normally corrosive materials.

One particularly revolutionary application is in the bonding of metal hypodermic needles to glass syringe barrels, a process heretofore difficult and expensive. Greatly increased production results, as well as convenient and clean handling.

Carbide-Tipped Dead Centers Reduce Regrinds

Changing from ordinary HSS dead centers to carbide-tipped centers has solved a grinding problem at The Producto Machine Co.

The machining operation using dead centers in the setup, consists of rough and finish grinding Producto die set precision guide pins on Norton 6 x 30 grinders, using a 20" x 3" wheel at 1,100 rpm. The rough grind removes approximately 0.015" to 0.020". The finish grind 0.001" to 0.002".

Using 1" x 6" guide pins as an example, a typical nine-hour day's production for each machine would be 200 to 300 rough ground pins, or 450 to 550 finished ground pins. At this rate of production, the ordinary centers burned up so quickly that each center had to be reground more than 40 times a year.

After installing the Red-E carbide tipped centers throughout the department, regrinds were reduced to six a year per center. Rejects, breakage, downtime, and labor costs were drastically reduced.

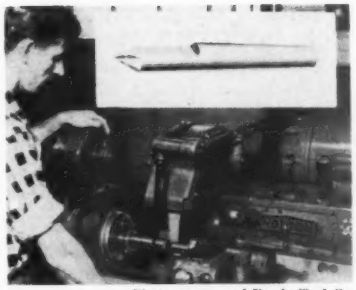


Photo courtesy of Ready Tool Co.

Here is a completely new electric-hydraulic forcing and straightening press, with construction and operating advantages never before offered in a low-cost shop press.

These are a few of the features:

- **Rapid Ram Approach** — Automatically changes to power stroke when it contacts the work.
- **Movable Workhead** — Self-contained—easy to center over the work. Workhead can be purchased separately.
- **Variable Ram Speed** — From zero to maximum under fingertip control.
- **Modern Design** — All operating controls at convenient working height.

These and dozens of other features are fully described and illustrated in new Bulletin No. 347, which we will send promptly on request. Send the coupon today.

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634 Seventh Street, Grand Haven, Mich.

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CIRCLE INFORM-A-GRAM KEY NO. 1611

. . . Zirconium, from page 159 . . . . . .

der at 1100°C (2012°F). Another method described consists of pretreatment in molten zinc chloride at 420°C (788°F) for 1 to 10 minutes, depending on the thickness of material.

Grinding

Zirconium is very similar to titanium in its grinding behavior. Using conventional grinding practice the wheels wear at rates 50 times that for hardened carbon tool steel and the surface is smeared and burned giving a poor surface finish. However, when much lower speeds are used in conjunction with grinding fluids quite satisfactory results are obtained.

	Roughing	Finishing
Approach angle	15°	30°
Top rake at right angles to approach angle	10 to 15°	25°
Side and end clearances	8°	8°
Plan relief angle	15°	15°
Nose radius	0.020 inch	0.050 inch

Surface grinding experiments have shown that the grinding rate increases to a peak value as the wheel speed is decreased from 6000 sfpm to somewhere between 4000 and 2000 sfpm depending on the wheel and grinding fluid and then decreases with further decrease in speed. The increase from the value at 6000 sfpm to the peak value is relatively small for poor grinding fluids such as plain water or commonly used dilute mixtures of general purpose soluble oils in water but is large for straight grinding oils.

Wheel speeds for which the grinding rate is high are those which give the best surface finish.

At conventional speeds there is a fire hazard because of the possibility of igniting the grinding oil with the heavy spark stream. However, at the slower speeds only a few sparks are given off and the fire hazard is no greater than when grinding steel.

Fine grained and strongly bonded wheels do not cut efficiently whereas loosely bonded cut-off wheels such as Carborundum 75C46Q9-BM 31 are more satisfactory. Regardless of the abrasive grain it will be consumed rapidly because zirconium readily adheres to and fouls up the grinding wheel in a manner comparable with aluminum and brass.

Machinability

Zirconium is readily machined by all standard operations such as turning, drilling, tapping, boring, face milling, slab milling, sawing and grinding. Precautions, however, must be taken against fire because overheated turnings may ignite. Overheating may be minimized by the use of generous clearance angles and sharp tools. High speed or metal carbide tools may be used. Tooling recommendations for tungsten carbide are given in the table at the top of this page.

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WHISTLER
10 HOLE MAGNETIC PERFORATING DIE

Cut die costs drastically, start production quicker. This M-12-14 Complete Introductory Unit includes a set of blank templates, ten punches, dies, strippers and punch and die retainers complete to make up a ten hole precision perforating die. Any diameters from ⅛" to ½" to your selection. Catalog illustrates additional re-use economies.

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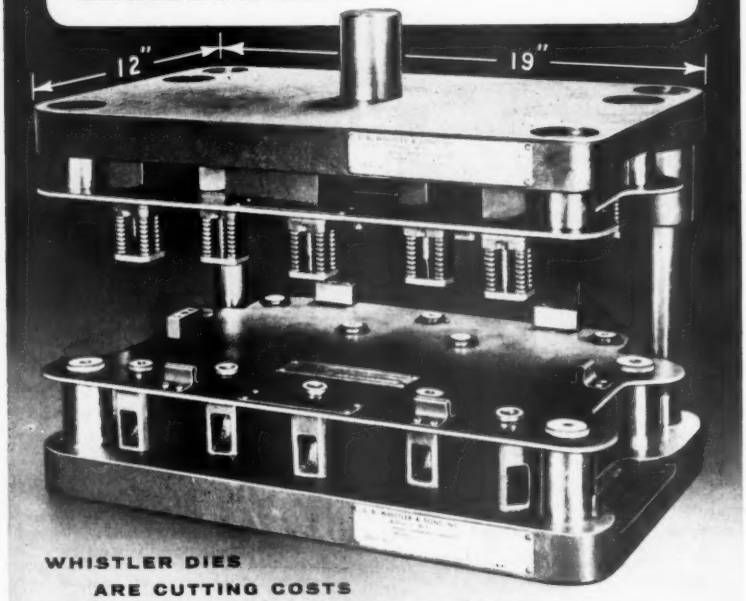
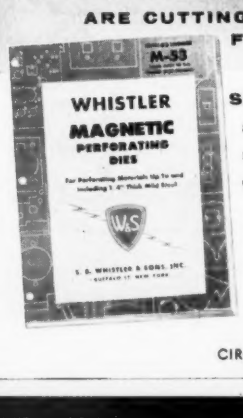


WHISTLER DIES ARE CUTTING COSTS FROM COAST TO COAST



SEND FOR CATALOG Illustration shows how quick and simple it is to set up a Whistler Magnetic Perforating Die ready for production. Larger standard units can be added to suit your requirements.

S. B. WHISTLER & SONS, INC.
Manufacturers of Adjustable, Magnetic and Custom Built Dies for All Industry

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CIRCLE INFORM-A-GRAM KEY NO. 1621

A peripheral speed of about 120 fpm is recommended for both roughing and finishing operations. Feed of tool per revolution may be about 0.010″ for roughing and about 0.005″ for finishing. The depth of cut is not critical except that it is advisable to avoid making fine turnings because of the fire hazard. Oxide scale on surfaces of metal subjected to high temperature treatments should be removed by blasting before machining because of its abrasive action on the tool.

Vertical face milling is reported to remove metal faster and give better surface finishes than horizontal slab milling. Surface feeds up to 250 fpm may be used for face milling when the cutter and work are flooded with a suitable water-soluble coolant. Rake angles should be adjusted so as to form a tightly curled chip that is thrown out of the cutter and clears the work, thereby avoiding the abrasive action of the work hardened chips on the machined surface. In face milling this is accomplished by using a 5° to 6° negative radial rake and a 10° to 15° axial rake with a 45° chamfer on the cutting edge.

Zirconium is readily sawed by mechanical saws with high speed steel blades. For heavy cutting, blades with 4 to 6 teeth to the inch give the fastest cutting and the cleanest chips.

Company Makes Large Two-Piece Surface Plates

Large two-piece granite surface plates can be made and sold at about one-half the price of a one-piece plate having the same total area, according to the Rahn Granite Surface Plate Co., 638 N. Western Ave., Dayton, Ohio.

Illustrated is a two-piece granite surface plate in the process of being aligned. Each section has three supporting pads underneath, topped with inexpensive levelling wedges. With a target placed directly over each pad, the alignment telescope insures levelling accurately to 0.001″. Closer alignment is made at the joint by checking with a height gage.

To produce Grade A accuracy (all points on the surface lying between two parallel planes separated by 0.001″) in a one-piece plate 6′ x 20′ with only three supports for the entire plate, would require a piece of granite 30″ thick. Since quarry equipment has been designed for a maximum size of 8′ x 12′, any size larger than that requires special rigging, greatly increasing costs. The two-piece plate, produced for approximately one-half the cost of a one-piece plate, can be leveled accurately to 0.001″ in 30 minutes.

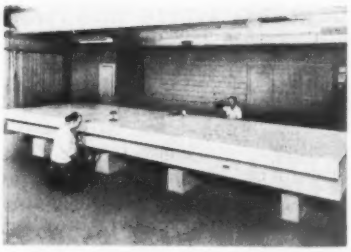

Photo courtesy Rahn Granite Surface Plate Co.

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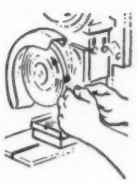

Clean up a wheel face

A NORBIDE Dressing Stick of Boron Carbide—the hardest man-made material—will outlast hundreds of ordinary dressing sticks.

With this light, handy stick you can see more of the wheel and thus avoid costly overdressing. You'll find it will greatly reduce dressing dust nuisance also.

Order a supply of these cost-cutting sticks from your local Norton distributor, or write for Form 1567 giving more details.

Form a radius or groove

Touch up a cup or saucer

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NORTON® BORON CARBIDE

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CIRCLE INFORM-A-GRAM KEY NO. 1631

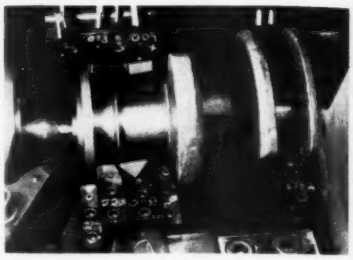
MULTIPLE TOOLING MACHINES FIRST CAST STEEL CRANKS

The automotive industry's first cast steel crankshafts were successfully machined recently on Wickes center drive lathes with Wesson Band-Type Multicut holders and Wessonmetal carbide at the Wickes Brothers' plant, Saginaw, Michigan. Initial tests show that crankshaft production with multiple carbide tooling will more than double previous methods.

Machining of the cast steel crankshafts parallels Wesson's development of the first carbide tooling successfully applied to the industry's first nodular (cast) iron crankshafts. (See TOOLING & PRODUCTION, Feb. '53, p 54).

Several major modifications, the result of continuing tool research and crankshaft development, are incorporated in the cast steel setup.

On the nodular iron crank machining, 34 tools are required to



turn all five main bearings, flange end and stub end while only 25 special Multicuts mounted on two slides are required on present steel crank tooling. On the nodular iron setup, a third slide consisting of additional Multicuts is designed to cheek the throws when required. On the steel setup, dual-insert holders which turn the mains and journal fillets are designed to also perform cheeking operations when required.

Accurate Casting

Because Auto Specialties Mfg. Co., Inc., of St. Joseph, Michigan, is producing the castings with close precision tolerances, it has not yet been found necessary to touch the throws.

Many cost reducing features such as adjusting screws extending through the blocks making insert adjustment easier and quicker are incorporated into the tool setup.

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TOOLS
WHEELS

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Hammond Carbide Tool Grinders will soon pay for themselves thru greater wheel economy, longer tool life and FASTER grinding. They relieve toolroom bottlenecks and step up production. Write for Carbide Grinder Catalog.

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CIRCLE INFORM-A-GRAM KEY NO. 1641

AIR-POWERED ROLL MARKING MACHINE

Working under any desired pressure up to 7500 psi, a new automatic roll marking machine will produce as many as 6000 impressions per hour. The machine will indent numbers, letters or designs on all types of metallic or non-metallic surfaces — round, flat or irregular.

The machine is powered by air and operated by electrical remote control for hand, foot or fixture actuation. Automatic feed fixtures, such as dial and slide fixtures, chute feed fixtures, and motorized hopper feeds can easily be synchronized with the machine by use of the remote control.

Because the marking head and table can be moved up, down, or rotated on the column, the ma-

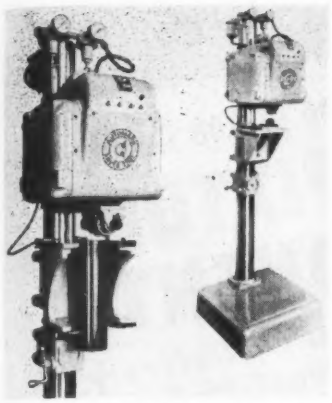

Photo courtesy Defiance Machine and Tool Co.

chine can accommodate unusually large parts. The table can also be removed and a large fixture face mounted to the table clamp on the column.

To mark flat surfaces, a round stamp or marking wheel is used which is automatically rolled across the surface to be marked. For round surfaces, a flat stamp is used. The stamp will follow any contours or irregularities. With an accessory the marking head can be adjusted to roll across the work a predetermined number of times to give greater depth of impression.

Impact Extrusion For Parts Of Complex Design

Constantly increasing efficiencies in impact extrusion techniques make it a process worth consideration by manufacturers requiring complex round, square, rectangular, oblong, cup or shell-shaped parts, or simple parts having a length-diameter ratio exceeding 2 to 1.

Impact extrusion is a relatively simple operation, combining cold or hot forging and conventional extrusion. A blank or "slug" is placed in a shallow die. A punch rams down onto it, and the metal is forced up and around the punch, the flow of metal being guided by the shape of the die. The resulting impact extrusion with its forged base and extruded side walls has desirable wrought metal characteristics, and near-maximum physical properties are generally attained.

Tool and die costs are almost always lower than for other applicable processes. For example, if it were possible by usual deep drawing method to produce a simple round can 2" in diameter with an over-all length of 16", at least four draws would be required. A four-station progressive draw die would cost at least $2,800.00. The same part can be produced by impact extrusion at a total cost of less than $900. Further, differences in production rates and scrap savings are usually in favor of impact extrusion over deep drawing and other multi-stage processes.

Magnesium Company of America, a leading light metals fabricator, is expanding its Impact Extrusion Department to produce parts made by this process in all extrudable metals — magnesium, aluminum, lead, zinc, tin, copper, and alpha brasses. This company recently installed an additional 750-ton, 35" stroke press capable of impact extrusions to 2½' long.

Now you can buy a press brake like this "off the shelf" for $1455

Verson now offers standard brakes with immediate delivery from stock

Any shop where metal is bent can now take advantage of a new convenient way of buying quality all steel press brakes. There's no need for involved proposals or a long wait for delivery. You can now buy Verson No. 16-48 and No. 1062 brakes as easily as buying a car. Prices are published publicly and delivery of standard models is made from *stock.*

The 16-48 (shown above) has 15 tons capacity and will bend up to 48" of 16 ga. mild steel. It is priced at $1455. The 1062 has 25 tons capacity and will bend up to 78" of 16 ga. mild steel. It is priced at $2190. Standard 90° "V" dies are also available from stock. 78" long set for the 1062 is priced at $124. 48" long set for use in either machine is priced at $93. These dies are capable of handling 16 ga. steel.

Write for spec sheets on either model and then place your order. We think you'll like this new way of buying equipment.

A Verson Press for every job from 60 tons up.

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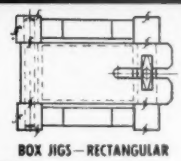
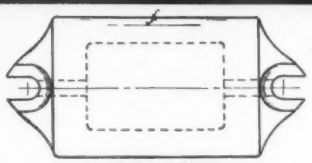
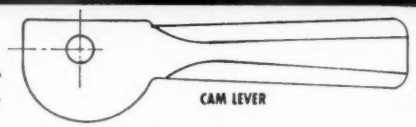
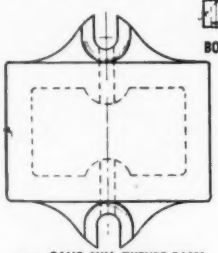
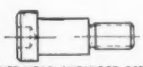
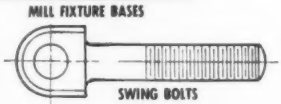

BOX JIGS—RECTANGULAR

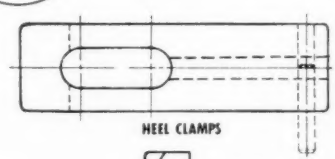

MILL FIXTURE BASES

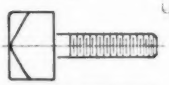

CAM LEVER

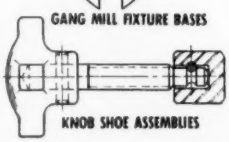

GANG MILL FIXTURE BASES


SOCKET HEAD SHOULDER SCREWS


SWING BOLTS


HEEL CLAMPS


QUARTER TURN SCREWS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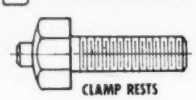
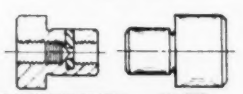
GROUND THREAD STUDS


CLAMP RESTS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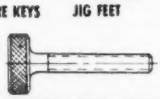
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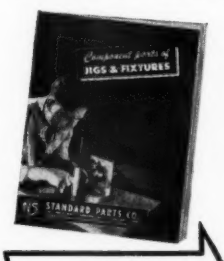

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INFORM-A-GRAM FEBRUARY 1955 ISSUE

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9	26	45	63	1063	1181	1271	1322	1471	1641	1732	1802	1852	1911	1971	2034
10	27	46	64	1071	1191	1272	1323	1481	1651	1741	1803	1853	1921	1972	2041
11	28	47	65	1081	1201	1273	1331	1491	1661	1742	1804	1861	1922	1973	2042
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14	32	50	68	1102	1222	1291	1351	1521	1682	1761	1813	1872	1931	1983	2053
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16	34	52	971	1104	1241	1302	1361	1541	1684	1763	1822	1874	1941	1985	2081
17	35	53	991	1111	1251	1303	1371	1551	1691	1764	1823	1881	1942	1986	

EDITORIAL ITEMS

A1	A18	A35	A52	B4	B21	B38	B55	D6
A2	A19	A36	A53	B5	B22	B39	B56	D7
A3	A20	A37	A54	B6	B23	B40	B57	
A4	A21	A38	A55	B7	B24	B41	B58	
A5	A22	A39	A56	B8	B25	B42	C1	
A6	A23	A40	A57	B9	B26	B43	C2	
A7	A24	A41	A58	B10	B27	B44	C3	
A8	A25	A42	A59	B11	B28	B45	C4	
A9	A26	A43	A60	B12	B29	B46	C5	
A10	A27	A44	A61	B13	B30	B47	C6	
A11	A28	A45	A62	B14	B31	B48	C7	
A12	A29	A46	A63	B15	B32	B49	C8	
A13	A30	A47	A64	B16	B33	B50	D1	
A14	A31	A48	A65	B17	B34	B51	D2	
A15	A32	A49	B1	B18	B35	B52	D3	
A16	A33	A50	B2	B19	B36	B53	D4	
A17	A34	A51	B3	B20	B37	B54	D5	

Which article in this issue was of most interest to you? _____

THESE INFORM-A-GRAM CARDS are for the convenience of *TOOLING and PRODUCTION* readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured — all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the numbers of the items wanted. If there is no identifying number, use the page number.

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A6	A23	A40	A57	B9	B26	B43	C2	
A7	A24	A41	A58	B10	B27	B44	C3	
A8	A25	A42	A59	B11	B28	B45	C4	
A9	A26	A43	A60	B12	B29	B46	C5	
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A12	A29	A46	A63	B15	B32	B49	C8	
A13	A30	A47	A64	B16	B33	B50	D1	
A14	A31	A48	A65	B17	B34	B51	D2	
A15	A32	A49	B1	B18	B35	B52	D3	
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A17	A34	A51	B3	B20	B37	B54	D5	

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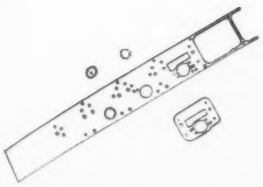
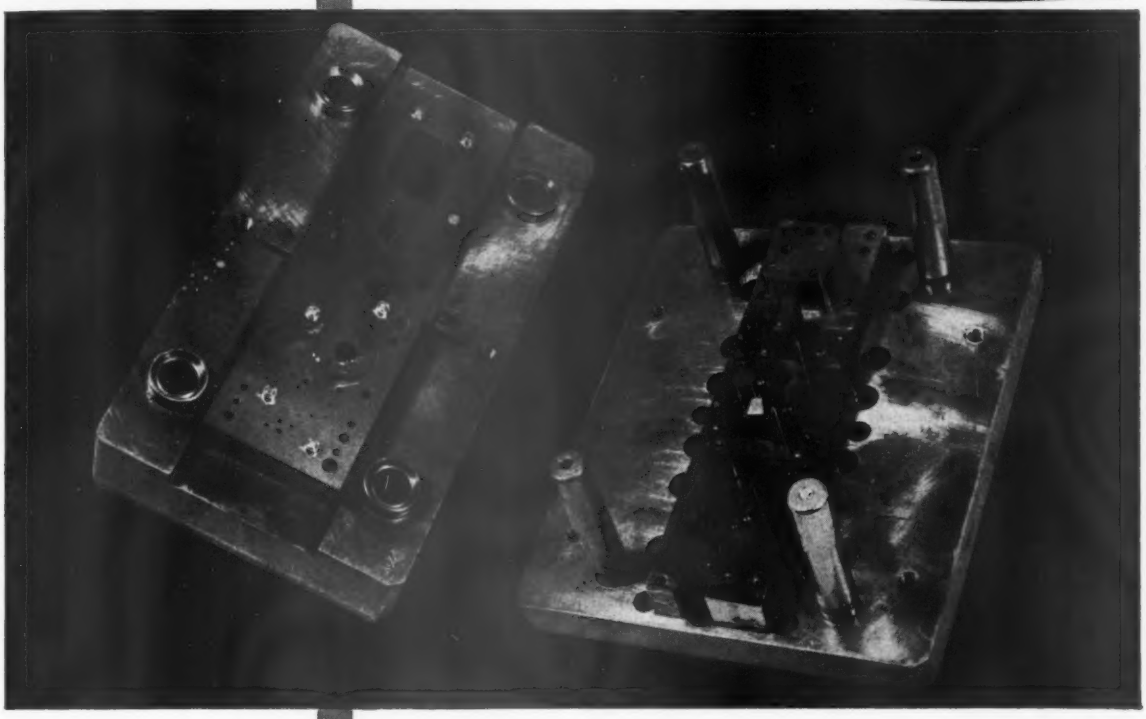


This HURON Lamination Die Gave Initial Run of 426,000!



Write for BLUE SHEET on HURON

This concise four-page folder gives all needed handling and shop treatment details on Huron. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

ADDRESS DEPT. TP-62

LUDLUM HURON high-carbon, high-chrome die steel was the material used in this motor lamination die. Here was the result when the die was run on a 45-ton Bliss press at 210 strokes a minute:

1. Initial run was 426,000 pieces
2. Average run since has been 250,000 pieces
3. Although burr tolerance is .003", grinding of punch and die between runs has not exceeded .008"

LUDLUM HURON WAS SELECTED because of its known high resistance to wear, especially under heavy pressures, and its excellent non-deforming qualities. Because Huron is an oil-hardening steel and hardens uniformly to a great depth, a consistent production rate after each grind was assured.

There's an A-L Tool Steel that will help solve your cutting, forming or blanking problem. Call our nearest office or distributor today, or write *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pennsylvania.*

For complete **MODERN** Tooling, call

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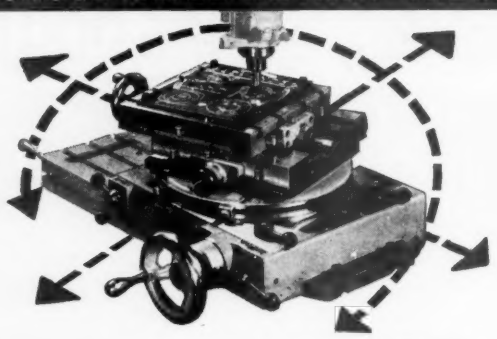
ADVANCE
CROSS-SLIDE ROTARY TABLE



CUT Set-Up Time Cost As Much As **90%***

Make multiple radii and angle milling cuts accurately with only ONE set up! On your standard vertical mill, equipped with ADVANCE Cross-Slide Rotary Table, you can make all such cuts without re-clamping work. Size of radius you can cut is limited only by milling machine table movement. Ideal for molds, dies, patterns, etc.

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solve heat-treat problems
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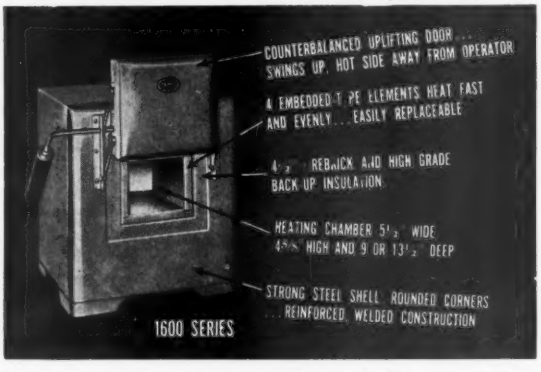
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Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy to install and operate, low cost. Priced from $55.00 to $507.50. Write for literature and nearest dealer's name.

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The Odee-HONE

★ ACCURATE
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Corrects out-of-roundness, waviness, chatter . . . Generates diametric size within .0001" tolerance . . . Hones all parts from ½" to 2½" in diameter—regardless of length or material . . .

Can be used on any lathe, drill press, electric drill . . .

Simple to set up and operate—no aligning, fixturing or wheel dressing is necessary . . .

Removes a few "tenths" or a few "thousandths" stock in less time than it takes to re-center, indicate a part, and dress an abrasive wheel.

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CUSTOM MADE
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STAMPINGS
IN SMALL LOTS

Since 1921 we have specialized in the production of accurate die-cut metal stampings in small lots. The tool cost is low . . . actually as low as 15% to 20% of the cost of permanent tools. We guarantee dependable service and delivery on date specified.

• **SEND** us a sample or blueprint. We'll quote you a price. Or write for detailed information.

DAYTON ROGERS *Manufacturing Company*

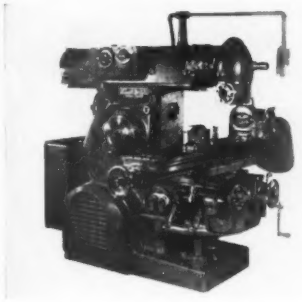
Minneapolis 7B, Minnesota

CIRCLE INFORM-A-GRAM KEY NO. 1864

GET VERSATILITY WITH RAM HEAD MILLING MACHINES

A new line of ram head milling machines offering industry a machine tool with a "dual personality" has been introduced by the Kearney & Trecker Corp., Milwaukee producer of precision milling machines.

This line of general purpose production machines combines a conventional horizontal spindle



and a self-contained motorized sliding ram for adjustable cutting heads. As a result, horizontal and vertical spindles can be run separately and simultaneously.

The ram head machines are available with a choice of three cutting heads — universal, vertical, and quill types—all of which can be rotated through 360°. This means the user can perform vertical, horizontal, and angular milling on one machine in a single setup.

Built in Model CH, CK, and CSM designs with 69 different working range combinations and sizes from No. 2 and No. 4, the ram head machines may be equipped with either standard directional table control, or mono-lever with automatic cycle table control.

For minimum maintenance, the head is individually motor-driven and has its own lubrication system and speed change mechanism. When used as a standard horizontal machine, the ram acts as a heavy duty arbor support.

For further information, contact Kearney & Trecker Corp., Milwaukee 14, Wis., or—

Circle Inform-A-Gram No. D2.

BUY U. S. SAVINGS BONDS

Best Check for

Parallelism...

Squareness...

Angles...

Perkin-Elmer's Optical

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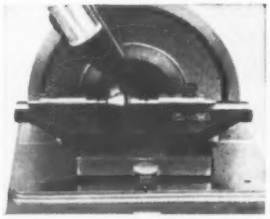

Checking taper angle (above). Checking micrometer for parallelism of anvil and spindle faces, thread runout and frame alignment (above, right).

Simplifies and speeds inspection of parts, even though difficult to approach by other means. Measurements read directly from graduated reticle. Operates entirely on optical principles—no physical contact with part required—precision is independent of the operator.

For descriptive booklet write:
The Perkin-Elmer Corporation, 818 Main Ave., Norwalk, Conn.

PERKIN PEC ELMER

Optical Tooling for the Modernized Machine Shop

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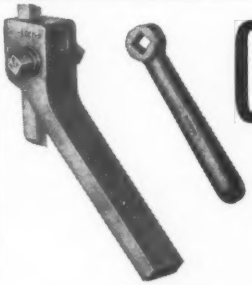
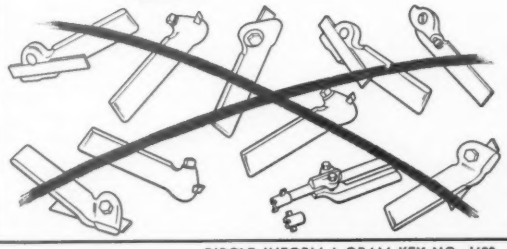


ONE ALL-PURPOSE TOOL HOLDER INSTEAD OF TEN



ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading . . . Ideal for carbide tools . . . Bit sizes: ¼", 5/16", ⅜", 7/16", ½", ⅝".

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For milling, slitting and gang-saw setups, shimming gears and bearings. Sets in 20 diameters ⅞" to 4" . . . 19 graduated thicknesses .001" to .125", specials over .125". Spacers with keyways, shims without. Stocked by Industrial Distributors.

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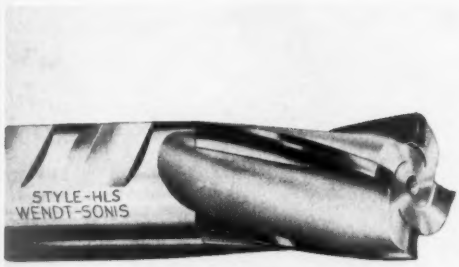
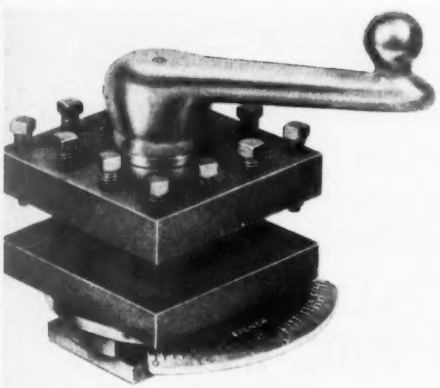


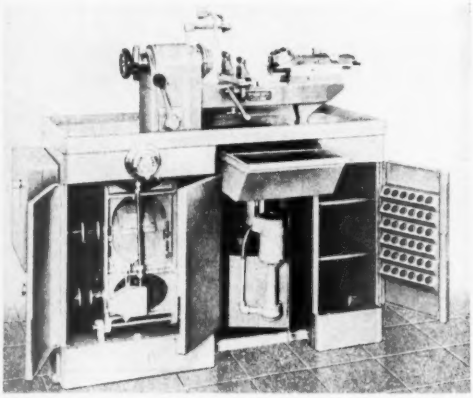
CARBIDE MILLS . . .

Carbide-tipped end mills and shell mills are now available with helical teeth from Wendt-Sonis Co., Hannibal, Mo. "Shear Carb" mills obtain smoother finishes with less power because of the tooth design. Sizes offered are from ½" to 2" diameter for end mills, and 1¼" to 6" diameter for shell mills, in styles and carbide grades to machine any material.
Inform-A-Gram No. A1.



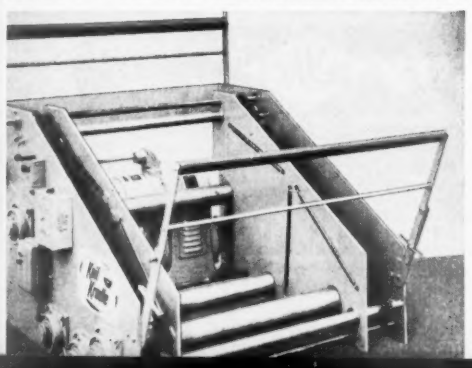
TOOL HOLDER . . .

The Elby French Turret Tool Holder, named for the inventor, gives super accurate indexing, with 120 possible positions. The turret is adaptable for carbide tools (it holds four tools) and has a 12 position detent selection, ± 0.001 at 24" from the centerline. The holders are fitted to individual lathes. Mfg. Div'n, O.K. Rubber, Inc., Littleton, Colo.
Inform-A-Gram No. A2.



SCREW MACHINE . . .

The gear box drive on the new Wade No. 73 precision hand screw machine has a new clutch arrangement that provides mechanical reversing. Helical gears in constant mesh, together with a clutch yoke and variable pitch drive pulley, eliminate the heavy resistances usually required in the electrical drive. Wade Tool Co., Waltham, Mass.
Inform-A-Gram No. A3.



"KOIL KRADLE" . . .

A new, heavy duty Koil Kradle of 7000 lbs capacity is announced by Benchmaster Mfg. Co., Gardena, Calif. It accommodates coil stock up to 42" in diameter and 40" maximum width.
Inform-A-Gram No. A4.

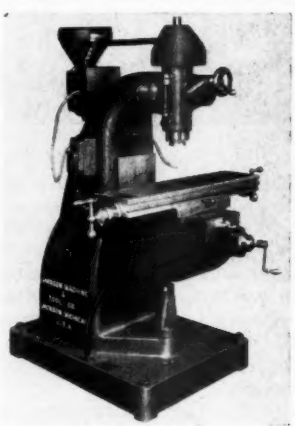
"NO-GRIND" TOOLS . . .

A new single-point cutting tool employing a wafer-type indexable throwaway carbide insert, adjustable mechanical chip control and hardened, replaceable anvil is announced by The Viking Tool Co., Shelton, Conn. The chip control block locks with the top

surface of the insert to eliminate galling or wedging of the chip. A replaceable anvil which absorbs shock in the event of damage resulting from accidental carbide fracture is also included.
Circle Inform-A-Gram No. A5.

VERTICAL MILL . . .

The new model of the Jackson high speed vertical milling machine features three power rates, down feed to the spindle, and optional power feed to the table. The machine has six spindle speeds ranging from 220 rpm to 2300 rpm. Power down feed rates



are 0.0017", 0.0003", and 0.0053" per spindle revolution. The machine has a rugged 4¼" diameter quill and No. 40 National Standard spindle taper, allowing the use of a wide range of standard tools and adapting the machine for tool room and production work. Jackson Machine & Tool Co., Parma, Mich. **A6.**

ON PARADE

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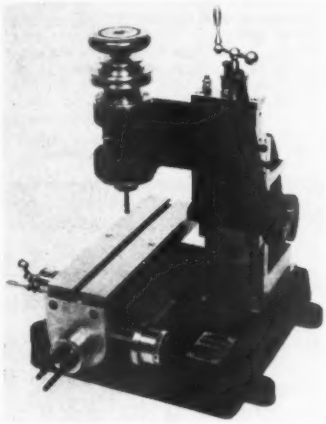
MICROMILL . . .

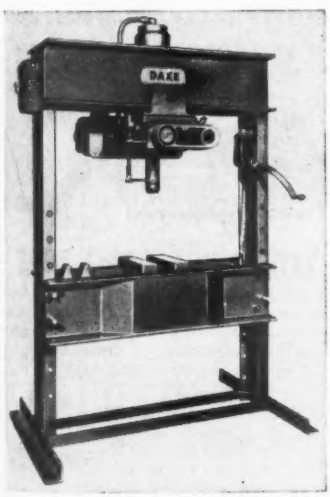
The Derbyshire Vertical Micromill will handle drilling, reaming, tapping, counterboring, spot facing, and grinding in addition to milling. The redesigned mill



includes four-position stops to provide accurate hole location quickly on small jig boring work. The headstock now has preloaded duplex bearings. Speeds run up to 20,000 rpm. F. W. Derbyshire, Inc., Waltham, Mass. **Circle Inform-A-Gram No. A7.**

"ELEC-DRAULIC" PRESS

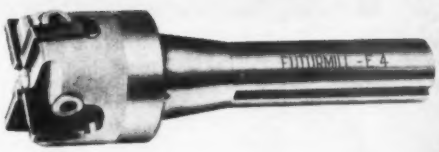
Rapid ram approach on the new electric-hydraulic shop press by Dake Engine Co., Grand Haven, Mich., eliminates the use

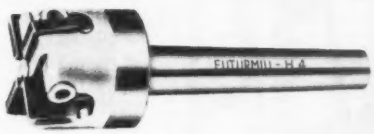


of a hand wheel. The self-contained workhead is readily movable on needle bearings to center over the work. Ram stroke is 10". **Inform-A-Gram No. A8.**

CARBIDE CUTTERS . . .

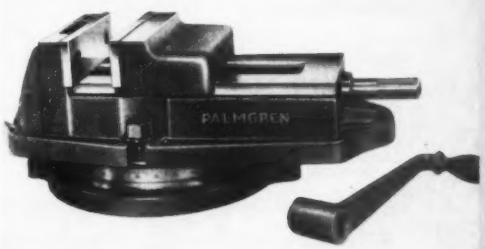
"Futurmill" Cutters have four solid carbide indexable blades which can be indexed eight times before regrinding is necessary. Available in 2" diameters, the Futurmill series is principally designed for Bridgeport milling machines and milling heads. The Detroit Milling Cutter Co., Farmington, Mich., will supply further information.
Inform-A-Gram No. A9.





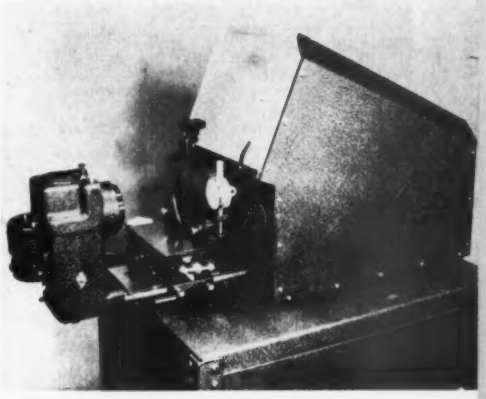
MILLING VISE . . .

The "Palmgren" No. 40B flanged milling machine vise may be used with or without the 360° graduated swivel base. The precision built vise has jaws 4" wide, opens 4", and has a jaw depth of 1½". It is constructed for operations which require a rugged holding device. Chicago Tool and Engineering Co., 8383 S. Chicago Ave., Chicago 17. **Inform-A-Gram No. A10.**



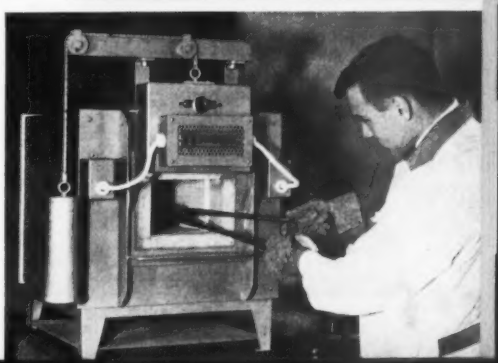
COMPARATOR . . .

The compact design of the new economy size duplex-type Universal Optical Comparator incorporates all the basic features required for tool room or production line inspection in either a vertical or horizontal position. Standard 8½" by 11" overlay charts can be accommodated; platform stage is 5" by 7". Portman Instrument Co., Inc., New Rochelle, N. Y.
Inform-A-Gram No. A11.

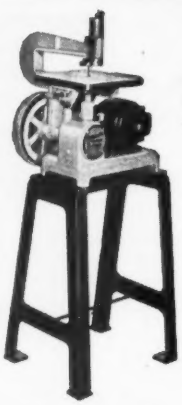


MUFFLE FURNACE . . .

The "Alloy 10" muffle furnace by Hevi Duty Electric Co., Milwaukee 1, Wis., is efficiently used for all laboratory operations requiring temperatures to 2350° F. Bulletin 339 is available.
Inform-A-Gram No. A12.



CUT TOOL AND DIE-MAKING COSTS WITH . . .
Milwaukee
DIE FILERS
PROFILE GRINDERS



DIE FILERS
. . . for straight-line sharp corner filing, sawing and lapping

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

Write for illustrated Bulletins and Prices

PROFILE GRINDERS
. . . for high speed Precision Grinding of curved and Irregular Contours

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

RICE PUMP & MACHINE COMPANY
328 PARK AVENUE BELGIUM, WISCONSIN
CIRCLE INFORM-A-GRAM KEY NO. 1721

SAVE $10,000.00 in perishable tool inventory with HAYDEN ADJUSTABLE DRILLS

Only two ordinary drills, 1" and 2", needed in stock for hogging out metal. A Hayden Adjustable Drill will then cut the hole to its specified size. Adjustable drills come in two sizes, 1" to 2"; 2" to 4". Blades are high speed steel. Carbide tipped blades at extra cost. Write for Literature and Price List.

DOUBLE LOCKED

HAYDEN TWIST DRILL CO.
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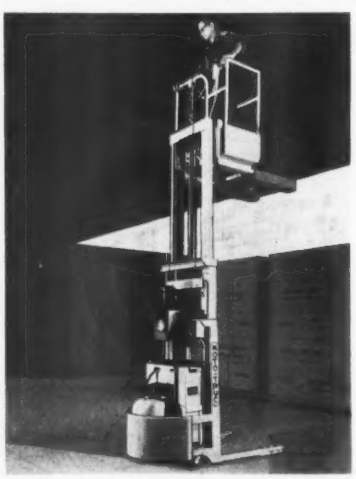
No Calculations are required to operate the Acorn grinding fixture. Simple settings are all that is needed to accurately resharpen circular cutting tools; proper relationship between cutting face and centerline of tool, as well as same degree of hook, are maintained at all times. The

Acorn fixture adapts to any make of surface grinding machine, with or without magnetic chucks, and can be used to grind with the periphery or the side of the grinding wheel. For complete details, write Pabco Industries, Inc., 6943 W. Grand Ave., Chicago 35.
Circle Inform-A-Gram No. A13.

A Belt Grinder for heavy duty production grinding of ferrous and nonferrous metals has been introduced by the Ven Corp., 2882 Newell St., Los Angeles, Calif. The Model 100 grinder is constructed for wet grinding and has built-in coolant reservoir and coolant collecting troughs.
Circle Inform-A-Gram No. A14.

The Hi-Rider Truck is especially useful for maintenance operations. The complete controls for the truck go up with the operator. A safety factor unit automatically eliminates



all but the slow speed once the lift is over four feet in the air. Power is from a 12 volt battery. The manufacturer is The Moto-Truc Co., 1990 E. 59 St., Cleveland 3, Ohio.
Circle Inform-A-Gram No. A15.

RAPID SET-UPS with extreme accuracy—every time and on the first try!
Brookfield TOOL HOLDER

One Brookfield Tool Holder = One Conventional Tool Holder + Stock of at least 100 Bushings.

In Essence: A Floating, Precision Vise

- Adjustable V Jaw
- Axially True Design
- Balanced-Pressure Locking

No more fussing with bushings . . . just slip tool in jaw and tighten . . . run-out is less than .0001 per inch . . . Brookfield Tool Holders guarantee clean, easy, solid set-ups every time and on the first try! Models available for nearly all automatic and hand screw machines, turret lathes, radial drills, etc. Also useful as Adjustable Steady Rest and Work-Holder.

Write Dept. H. for descriptive brochure

BROOKFIELD, INC. 240 Cushing St. Stoughton, Mass.
CIRCLE INFORM-A-GRAM KEY NO. 1723

How flat should YOUR SURFACE PLATES be?

This informative, FREE BOOKLET will help you to:

1. Determine your particular needs.
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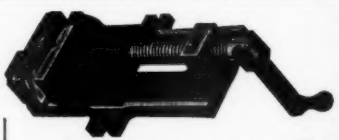


YOST DRILL PRESS VISE

• This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

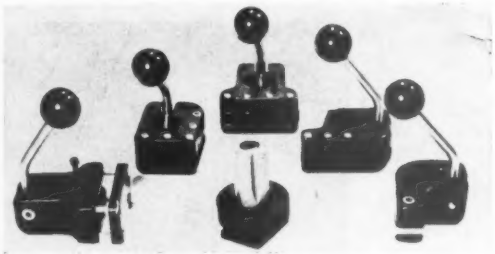
Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type? *Write today for bulletin on the extensive Yost line*

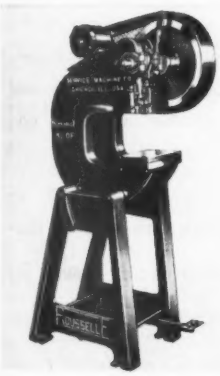
YOST MFG. COMPANY
1000 MAIN STREET
Meadville • Pennsylvania
CIRCLE INFORM-A-GRAM KEY NO. 1725

A Precision Drill Press for production drilling of small parts is the Model "P" by Precise Products Corp., 1328-30 Clark St., Racine, Wis. Speed range varies from 100 rpm to 45,000 rpm, allowing efficient and sensitive drilling of holes from 0.014" to 0.250" in diameter. Drill heads are adjustable vertically along the steel column and may be turned through 360° for small angle milling operations.
Inform-A-Gram No. A16.

Sabre Tool Holders are quick-change holders whose design is based on the principle of drawing together two hardened surfaces by means of wedging cam action to insure repetitive tool use. Because of the design there

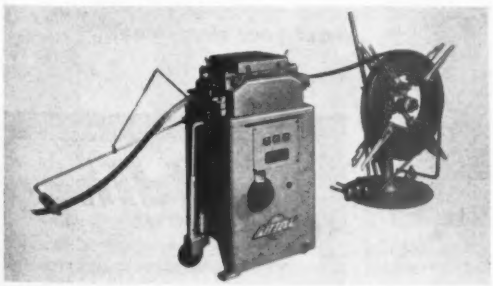


is less overhang with these holders and all general machining operations can be performed with the five basic models. Adams Equipment Co., 4200 W. Burbank Blvd. Burbank, Calif., will supply literature.
Circle Inform-A-Gram No. A17.



Punch Press. The new Rousselle Model OF-5-ton open back inclinable punch press features a 9" throat that permits working to the center of 18" sheets. The frame is an extra heavy semi-steel casting with a 6" opening through the back. The flywheel operates at a speed of 250 rpm, die space is 7½", standard stroke 1¼", and it can be furnished in either floor or bench model. Service Machine Co., 7629 S. Ashland Ave., Chicago 20, Ill.
Inform-A-Gram No. A18.

Model 208 Variable Speed Straightening Machine by F. J. Littell Machine Co., 4127 N. Ravenswood Ave., Chicago 13, is especially designed for handling ferrous



and non-ferrous stock and has 17 power-driven straightening rolls. It straightens small parts up to 3/32" thick.
Circle Inform-A-Gram No. A19.

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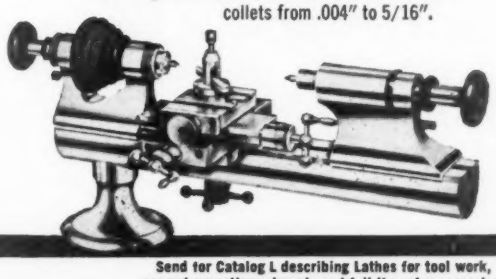
Twenty-three models for all types of work. 4" swing, Bed Length 12" or 18"; over 100 stock sizes of collets from .004" to 5/16".



Send for Catalog L describing Lathes for tool work, second operations; turrets and full line of accessories.

LOUIS LEVIN & SON, INC., 3610 S. BROADWAY, LOS ANGELES 7, CALIF.

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AUTOMATION
on your present
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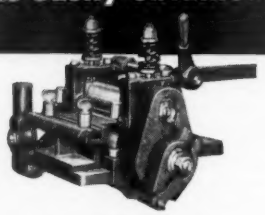
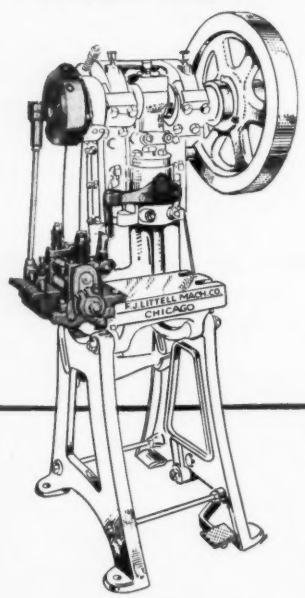
is easily obtained



with the
LITTELL
Style "M"
ROLL FEED



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AUTOMATION
at lowest cost

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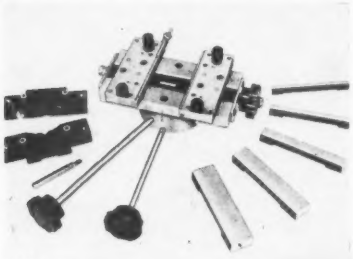
Littell Roll Feed Catalog today

F. J. LITTELL MACHINE CO.
4197 N. Ravenswood Ave., Chicago 13, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1741

Multi-Grip Vises for Engraving Machines. Pictured is the new Multi-Grip swivel vise, Model No. 710, featuring self-centering screw that keeps the work centered with the master copy. The standard jaws of this vise open to 3" and have dovetail grooves for holding flat plates. Each fixture comes with one set of parallel blocks which prevent buck-



ling or warping when thin plates are being engraved. Adjustable end stops and an extension permit centering all plates up to 8" long. Plastic jig plates are for clamping off-shaped articles. A companion model, No. 700, is a plain vise (non-swivel). Both are manufactured by H. P. Preis Engraving Machine Co., 647 U. S. Route 22, Hillside, N. J.
Circle Inform-A-Gram No. A20.

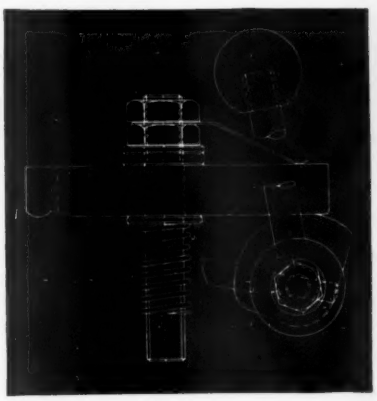
Die Handling. Rapid, efficient handling of dies is made possible with the Worksaver 4000 lb capacity die handling truck developed by The Yale & Towne Manufacturing Co., 11000 Roosevelt Blvd., Philadelphia. The truck has two forward and two reverse speeds and features time delay between each speed to assure smooth acceleration. The platform is 36" x 36" with triple rows of rollers 2¼" in diameter.
Circle Inform-A-Gram No. A21.

Industrial Scrubber. Here's a machine that removes loose scale and sludge from strip stock material on one side or both. The operator loads the Fuller Scrubber and the scrub-

bed, steam cleaned stock quickly emerges into a basket or onto a conveyor. Feed rate is 41' per min. Fuller Brush Co., Machine Div'n, Hartford 2, Conn.
Circle Inform-A-Gram No. A22.

Get the Lodding Jig and Fixture Parts Habit

It is a good habit to save time and money on Lodding parts. Nationally distributed—complete stocks—650 items—Coast to Coast.



Lodding self-positioning clamp assembly. One motion positions clamp and clamps work. Another releases and retracts.

Why go through the costly motions of making your own jig and fixture parts? Lodding mass-produced line is as handy as your nearest Lodding distributor —in all industrial centers—to meet your every need.

Lodding INC.
84 BEACON ST., WORCESTER 1, MASS.
THE STANDARD LINE
OF JIG AND FIXTURE COMPONENTS

CIRCLE INFORM-A-GRAM KEY NO. 1742

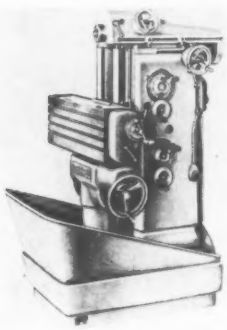
The "Power Drive" Cylinder by National Pneumatic Co., Inc., 125 Armory St., Boston 19, Mass., can be operated on 500 psi maximum oil or water service or 200 psi on air, without interchanging or adding parts. It has an extra-strong ground and polished stainless steel piston to give the rod seal, bearing, and wiper longer life. Bore diameters available are 1½", 2¼", 3", and 4".

Circle Inform-A-Gram No. A23.

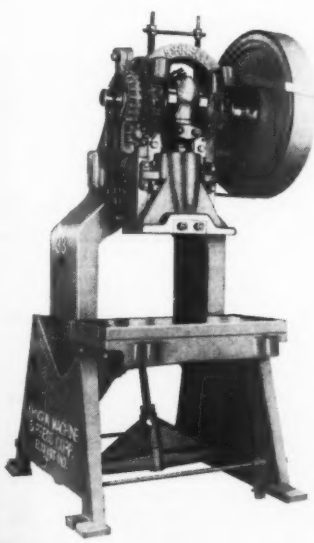
Drill Extractor and Drill Stop Chuck. A broken drill "frozen" tight in a hole is easily removed without removing the set-up, with the Wohlnip Twist Drill Extractor (upper photo). The Drill Stop-Chuck (lower photo) by Wohlnip features nonrotating "hole depth control." It is quickly attached to drills or other tool shanks while in or out of the machine. Literature is available from Wohlnip Engineering Co., 390 Hillside Ave., Hillside, N. J.

Inform-A-Gram No. A24.

Improvements on the Deckel Model FP-2 universal milling and boring machine include increased size of workpiece capacity and an increased number of speeds and feeds. Major features include two-directional power feed to spindle head, axial adjustment of spindle in head, and directional single-control of table feeds and speeds. Details are available from Deckel's U.S. representative, Cosa Corp., Chrysler Bldg., New York, N. Y.



Inform-A-Gram No. A25.



New Press. Model 33 open back inclinable punch press is a 27-ton capacity unit with standard 2½" stroke, with up to 6" stroke available. Bed size is 32" by 16" with a 21" opening through back. Standard rate for the flywheel model is 120 strokes per min, and 53 strokes per min with the geared type. Specification bulletins are available from Johnson Machine & Press Corp., 620 W. Indiana Ave., Elkhart, Ind., or —

No. A26.

Lathe Set-Up with Mel-O-Flo Coolant-Aerator No. 600

Mel-O-Flo®
COOLANT AERATOR
PAT. PEND.
FOR SOLUBLE & LIGHT OILS

Connects to the coolant line and mixes atmospheric air with coolant resulting in a non-splash aerated mixture that clings to work and tools. Good for lathe, milling, drilling, grinding, etc.

COOLS & CLINGS BETTER — Aerated Coolant clings better, reduces centrifugal throw-off, has superior wetting action, accelerates heat dissipation; resulting in BETTER COOLING, LONGER TOOL LIFE & INCREASED PRODUCTION.

NON-SPLASH — Aerated Coolant does not splash — keeps operators and floors dry.

NON-CLOGGING — Mel-O-Flo COOLANT AERATOR has a self-cleaning mechanism that provides uninterrupted operation.

SIMPLE INSTALLATION — Mel-O-Flo COOLANT AERATOR connects directly to the coolant line — no compressed air is required.

LOW COST — #700 Mel-O-Flo COOLANT-AERATOR for Low Pressure Centrifugal Pumps $17.50
#600 Mel-O-Flo COOLANT-AERATOR for Gear or Vane Coolant Pumps or Central Systems $17.50

Write for Full Details

The above models with 12" Flexible Hose. Other hose lengths also available.

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SOLVE YOUR HOLE ACCURACY PROBLEM with Horberg PRECISION PIN GAGES

EXCLUSIVE CONCENTRIC ENTRY
TAPER for faster, more definite inspection of holes, for greater ease in centering.
Gage sets supplied for all common drill sizes.

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SETS: Two gages in each size, with convenient stand.
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ALL SHIPMENTS FROM STOCK

THE Horberg GAGE COMPANY
Affiliate of Horberg Grinding Industries, Inc.
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SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS

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480
(AC-50)
All collets in hexagon, square and round.
KLUTCH-KOLLET
Stop collet for accurate chucking to 2¾" dia. Soft hand for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

FOR ATLAS • LOGAN • SOUTH BEND
CRAFTSMAN • SHELDON LATHES, ETC.

LEVER-TYPE DRAWBAR ½" cap.
Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.
HAND DRAWBAR ½" cap.

Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!

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CIRCLE INFORM-A-GRAM KEY NO. 1761

DID YOU KNOW? The Hager
UNIVERSAL CARBIDE GRINDER
with the Patented RECIPROCATING ACTION

. . . Has a CHIP BREAKER ATTACHMENT and table for small radius grinding as STANDARD equipment.
Write for details!

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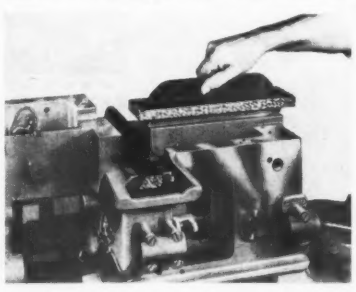
QUEENS VILLAGE 9 • NEW YORK
Mfrs. of Hager Measuring Microscopes

CIRCLE INFORM-A-GRAM KEY NO. 1762

A Portable Length and Width Comparator that can be used to check measurements on work in progress or on completed jobs has been designed by Jerpbak-Bayless Co.,

Solon, Ohio. It may be used on cylindrical or flat parts with accuracy within 0.0001". Two sizes are available: one ranges from 0" to 6"; the other, 0" to 12".
Circle Inform-A-Gram No. A27.

Beaver Surface and Angle Plate sets are precision made for checking dovetail cross slides, vertical slides, and turret slides of Brown & Sharpe automatic screw machines, enabling users to re-scrape and re-true worn



surfaces to new machine tolerances. Included in a set are a surface plate, dovetail angle plate, and two scrapers. Beaver Industries, 1500 W. Adams St., Chicago 7.
Circle Inform-A-Gram No. A28.

A Hinged-Steel Conveyor Belt featuring a dimpled surface is announced by May-Fran Engineering, Inc., 1726 Clarkstone Rd., Cleveland 12, Ohio. The dimpled design assures

drop off of flat pieces and scrap, even though covered with oil or compound or slightly magnetized, when the belt passes over the discharge end of the conveyor.
Circle Inform-A-Gram No. A29.

MICRO-HEIGHT GAUGE
BY FAIRFIELD GAUGE CO.

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

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Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

Toolmakers, Layout men, and Inspectors do better work faster with Micro-Height Gauge.

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CIRCLE INFORM-A-GRAM KEY NO. 1763

COMPLETE THE DIE-SET AT YOUR BENCH

Lacey Die-Set Machine

Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the diemaker to complete a die-set at his bench . . . saves toolroom and handling costs. Ask today for full details.

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740 Union Avenue Bridgeport 7, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1764

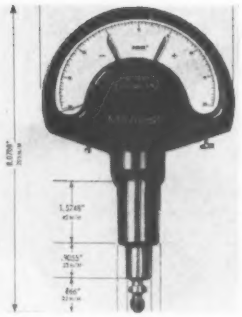
CAMS

MADE TO YOUR SPECS.

Dr. Charles Eisler, M. E. Pres.
EISLER ENGINEERING CO., INC.
732 So. 13th St., Newark 3, N. J., U. S. A.

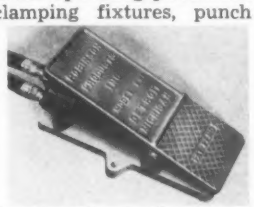
CIRCLE INFORM-A-GRAM KEY NO. 1765

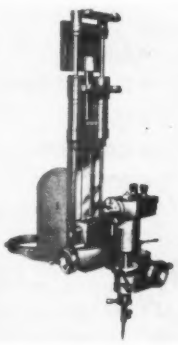
An Amplifying Comparator with a cable release lifting the contact point by remote control to protect the instrument from the heat of the operator's hand, unequal pressure, and vibration, is announced by the George Scherr Co., Inc., 200 Lafayette St., New York 12. The "Millimess" indicator has a wide range of 0.004" and is graduated in 0.00005". **Inform-A-Gram No. A30.**



Wilkerson Sump Drain Model 150SD-4, will automatically collect and discharge all moisture, free oil, and contaminants at any air line pressure from 10 to 250 psi. It measures 5" diameter by 8½" high and is made of cast aluminum. The unit can automatically collect and discharge over 400 gal of water per hour. Wilkerson Corp., 3395 S. Platte River Dr., Englewood, Colo. **Inform-A-Gram No. A31.**

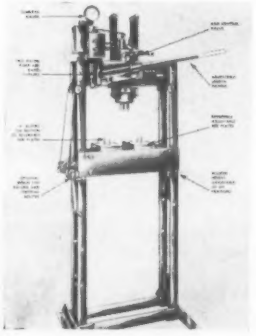
A Foot Controlled Air Valve for operating pneumatic equipment such as vises, clamping fixtures, punch presses, etc., is being manufactured by Robinson Products, Inc., 16550 Wyoming Ave., Detroit 21, Mich. Treadle valve design allows the operator to place full weight on the heel portion of the valve; shifting pressure to the forward part actuates the valve to the degree desired. **Circle Inform-A-Gram No. A32.**





The "Goodrich" Hydraulic Duplicator attached to any miller, lathe, shaper, or grinder multiplies production efficiency on all kinds of contour and die-making jobs. Produced by Automotive Service Tools, Inc., a div'n of Lansing Die Sinking Co., 617 May St., Lansing, Mich., the unit is powered by a motor which attaches to the machine's side and delivers pressure for automatic duplication. **Inform-A-Gram No. A33.**

25-Ton Arbor Press. Versatility and speed of operation are features of the 25-ton press recently introduced by The Manzel Div'n of Frontier Industries, Inc., 315 Babcock St., Buffalo 10, N. Y. The press has an adjustable handle and reversible and adjustable bed plates with "Vee" blocks attached to one side. A two-piston hydraulic pump closes the ram until the work is engaged, then a single piston pump takes over. **A34.**



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Mark Name Plates In 1/5 the Time

Cutting costs in these times is a good trick if you can do it. You can, on plates requiring detail marking, by using an Automark Electric Metal-Marking Typewriter. The operator lightly touches the key and the Automark does the rest, quickly and automatically. No dial to turn—no lever to pull. Marking output is increased five times and worker fatigue is greatly reduced. Write today for Bulletin 8-16.

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TYPEWRITER
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CIRCLE INFORM-A-GRAM KEY NO. 1771

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and be precision sure!

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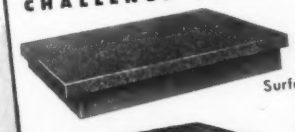
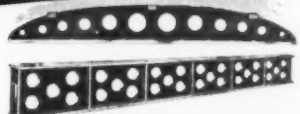


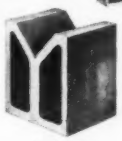
New! Clovis Black Granite Rated Class A. Surface accuracy guaranteed. 24 sizes.

Special Analysis Semi-Steel Fine grain. Precision ground or hand scraped.



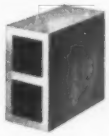
STRAIGHT EDGES for lathe bed ways. PARALLEL STRAIGHT EDGES for inspection of alignment.

UNIVERSAL BOX ANGLES Parallel to within .00025-inch.



V-BLOCKS V accuracy of .0005-inch.

ANGLE PLATES In 22 sizes for clamping & holding work.



BOX PARALLELS In every size for every use.

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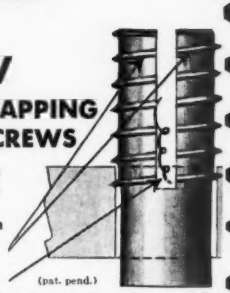
DEALERS IN ALL PRINCIPAL CITIES

CIRCLE INFORM-A-GRAM KEY NO. 1772

Announcing 2 New
Completely Different
SETKO
SET SCREWS

NEW
SELF-TAPPING
SET SCREWS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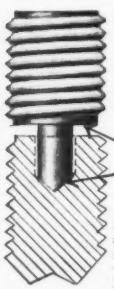
Save taps, save time, save on production cost!
2 Cutting Edges.

Cutting thread extends only around top or slotted section; cuts on both sides of hole; chips are gathered in slot. Self-aligning, self-tapping, self-locking! Can be supplied with any type set screw point. In full range, including the smaller sizes. Write for Bulletin.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NEW
PIVOT-LOK
SET SCREWS

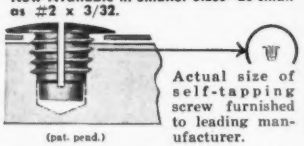
For jobs using two screws for security purposes, or where vibration is a factor.

Pivot on top screw acts as a bearing, avoids friction between the two screws and prevents damage to the lower socket.

Provides positive holding action, but both screws easily removed when desired. Send for Bulletin.

Also SELF-TAPPING FASTENERS

Now Available in Smaller Sizes—as small as #2 x 3/32.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Actual size of self-tapping screw furnished to leading manufacturer.

Self-tapping fastening screw, also self-aligning. Especially suitable for soft metals and plastics but will also work in steel. Write for list of sizes.

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158 Main St.
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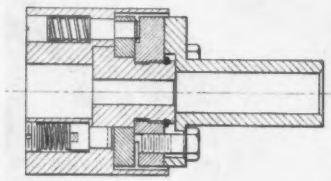
We specialize in Solving Puzzling Set Screw Problems

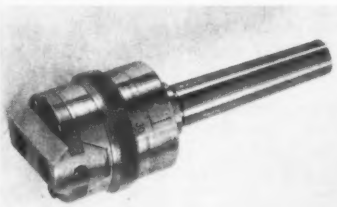
CIRCLE INFORM-A-GRAM KEY NO. 1781

Tap Holder. The secret of this releasing type tap holder lies in the design of the spring-loaded clutch pawl and clutch plate mechanism. Once adjusted for depth, the pawl



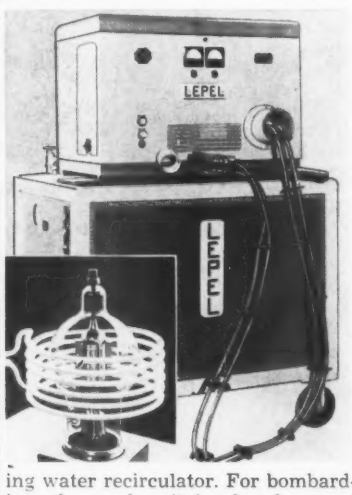
automatically releases the tap at the precise depth required. The holders are available to accommodate tap shanks from ½" to 1½" diameter, from Marcellus Mfg. Co., Belvidere, Ill. **Circle Inform-A-Gram No. A35.**

The Mico Offset Boring Head is adaptable to a wide variety of applications through the use of interchangeable shanks. Maximum offset capacity with standard slide bar is



¾". All slide bars accommodate ⅛" diameter tool shanks. The head has micrometer style adjusting collar. Mico Instrument Co., 88 E. Trowbridge St., Cambridge, Mass. **Circle Inform-A-Gram No. A36.**

Portable Induction Heating Unit. Lepel High Frequency Laboratories have developed a compact and completely self-contained high frequency heating unit combining an induction heating generator with a refrigerat-



ing water recirculator. For bombarding, the work coil is placed around the tube heating the metal components inside the glass envelope, as illustrated. Lepel, 55 and 37 Ave., Woodside, New York City. **Circle Inform-A-Gram No. A37.**

a NEW TOOL for INDUSTRY

SOLID Carbide TAPS

MANY TIMES LONGER LIFE IN

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- PLASTICS
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CARBIDE TAPS provide many times the wear of steel taps, when properly used, on recommended materials. They SAVE in many ways . . . on perishable tool costs . . . in hours of time by cutting "down" time on production runs . . . in gauging 100% sharpening time . . . by saving repetitive set-ups and spoilage of parts.

Not Recommended for Use on Steel
FROM STOCK OR MADE TO SPECIFICATIONS

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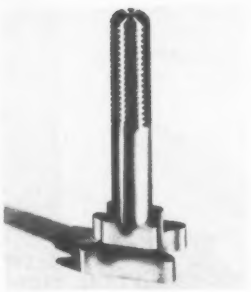
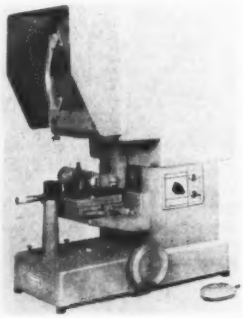
CIRCLE INFORM-A-GRAM KEY NO. 1782

"T" Slot Bolts by Standard Parts Co. have a newly designed concave head which cleans out the slot as the bolt travels on the work table. The new bolts are heat treated, coined after forging to assure precision surfaces, centerless ground, and coated with rust proofing. They are made of SAE 4140 steel. A bulletin is available from Standard Parts Co., 1000 Broadway, Bedford, Ohio.

Inform-A-Gram No. A38.

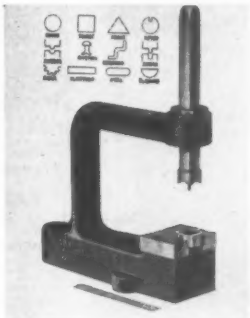




The Compact Optical Projector now being manufactured by Yale & Stocker features the newly developed Syntar lens systems which produce images having exact magnification at all parts of the screen. Magnification of from 10X to 100X may be obtained by either vertical or horizontal projection systems; both are possible by the flick of the switch. Lenses are interchangeable on the Model 10. Stocker & Yale, Inc., 753 Green St., Marblehead, Mass.

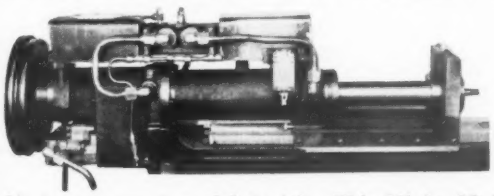
Inform-A-Gram No. A39.

"Ham-R-Press." Here's a low cost, hand operated punch press type tool designed to cut clean, accurate shapes in metal up to 1¼" in diameter and 14 gauge. Features of this press include simple operation and set-up, precision alignment of ram and work table, variable pressures of several lbs to 15 tons, and deep throat capacity (7½" and 12"). Made of tough alloy aluminum in two models, the Ham-R-Press is a product of the Chase Mfg. Co., 5008 W. Jefferson Blvd., Los Angeles, 6, Calif.



Inform-A-Gram No. A40.

The Versatile, High Production Hydraulic Unit by Rock River Engineering offers pin-point accuracy in automatic drilling, milling, or other operations where uniform automatic feeding is required; adaptability; and

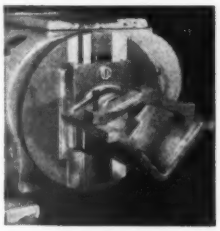


rapid change-over from job to job. This 1½ hp Model "E" is obtainable with ram stroke of 6", 9", or 12"; feed rate of 0 to 8" per min, with a transverse speed of 240" per min. Rock River Engineering Co., Empire Bldg., Rockford, Ill.

Circle Inform-A-Gram No. A41.

MICRO-CHUCK
ALL-PURPOSE WORK-HOLDING TOOL

- **SAVES TOOLING COSTS**
- **SAVES HOURS OF SET-UP TIME**



Complete MICRO-CHUCK assembly shown here includes MICRO-CHUCK and adaptor and horizontal vee plate attachment; is designed to hold castings, forgings, bar stock, other irregular work pieces. Available to fit 12" or 9" diameter plate lathes. Some of the many other attachments available are shown below.

Tooling up for a new product or special machining job is expensive, and often consumes priceless production time as well. Now MICRO-CHUCK eliminates this by offering a *universal* work-holding assembly that can be used time and time again for tooling up all different kinds of work such as castings, forgings, or odd-shaped parts. MICRO-CHUCK fits right on your present lathe; or use attachments on other machines such as drill presses, grinders, shapers, boring and milling machines. Work is brought quickly and securely to exact spindle center with two simple adjustments, and can even be used for eccentric machining operations.

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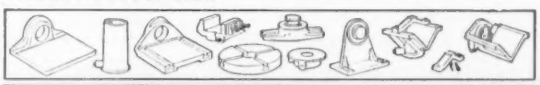

MICRO-CHUCK
Division, SCOTT-BROWNE CORP.
Batavia Pike • Newtown, Ohio
In Greater Cincinnati, The Machine Tool Center of The World

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37 STANDARD MODELS

SAVES INSTALLATION TIME

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THE PERFECT METHOD FOR HEAT TREATING TOOL STEELS AND ALLOY STEELS UP TO 1650°F!

SAVES TIME!

Simply coat piece to be treated — then harden or anneal as usual. It's that quick! This dry, easy-to-handle powder is applied in a jiffy — saves hours of costly finishing.

IMPROVES RESULTS!

Each finished piece is a shining example of production excellence. Phoenix Brand Non-Scaling Compound seals air out — assures *bright, pitless, scale-free* surfaces every time. Protective coating is removed in a flash — if necessary, just boil in plain water.

SAVES MONEY!

Polishing and grinding are virtually eliminated! Rejects are reduced! Furnace capacity and production increase — there's no cumbersome packs to crowd furnace.

Prove to yourself that Phoenix Brand Non-Scaling Compound can end your heat treating headaches for good — order a trial supply TODAY!

2 Lb. can	$ 6.00
5 Lb. can	$15.00
15 Lb. can	$41.25
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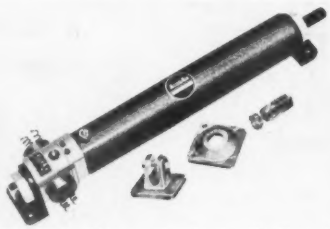
Available from your local distributor or

THE PARKER STAMP WORKS, Inc.
Established 1871
HARTFORD, CONNECTICUT

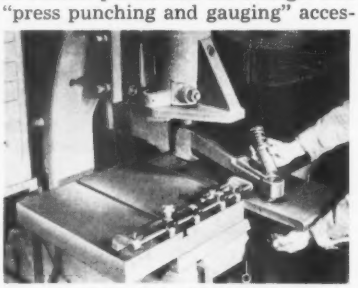
CIRCLE INFORM-A-GRAM KEY NO. 1801

Allenair Cylinders, Models SVA and SVE, feature integral valves in the rear head and are available in 2" and 3" bores, any length of stroke up to 60", and with or without adjustable cushions. On Model SVE, shown,



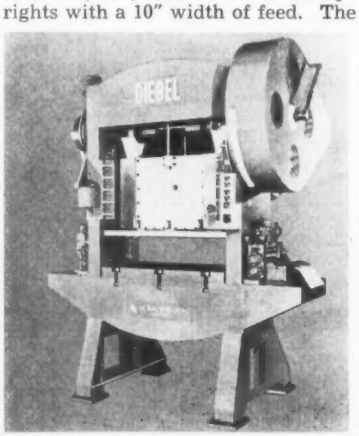
the actuation of the cylinder is through two solenoids available for either 110V or 8V operation. Actuation on the SVA is through two bleeder valves. A.K. Allen Co., 57 Meserole Ave., Brooklyn 22, N. Y.
Circle Inform-A-Gram No. A42.

The Wales "PPG Group" quickly converts open back presses into versatile hole punching machines with 20-second punch and die change. The "press punching and gauging" acces-

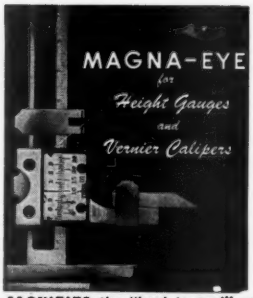


sory consists of steel bedplate, quick-change holder, 18" back gauge bar, 18" stop support rail, and combination auxiliary cabinet and tool rack. Wales Strippit Corp., 345 Payne Ave., N. Tonawanda, N. Y.
Circle Inform-A-Gram No. A43.

The Double Crank Welded Steel Press introduced by the builders of Diebel automatic presses is available with 30", 37", and 45" between uprights with a 10" width of feed. The



press features the Diebel cylindrical type ram for accurate alignment. Di Machine Corp., 2701 W. Irving Park Rd., Chicago 18.
Circle Inform-A-Gram No. A44.



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MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. **LENS** is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.
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711 W. Lake St. Minneapolis 8, Minn.

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Sensational new
VIBRA-FORGE* principle assures unbreakable welds every time!
BREN-WELD
PORTABLE BAND SAW BLADE
WELDER
...With Built-in Grinder
3/4" capacity

If you've been troubled with band saw blade breakage investigate this Bren/Weld unit built on the new Vibra-Forge principle. It gives you:

- PERFECT WELDS.
- NO BREAKAGE.
- NO FAILURES.
- WEIGHS ONLY 35 LBS.
- OPERATES ON 110 V, AC.
- UNCONDITIONALLY GUARANTEED.

LIST $169.50 PRICE

Write today for complete details

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SALES DIVISION
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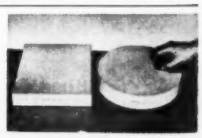
Integrity Since 1919
32-14 Northern Blvd., Long Island City 1, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1803

FIXED ABRASIVE



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This manufactured Stone laps and polishes most metals in minutes. The least skillful person can produce a 2 Micro-inch finish, even on hardened steel, in minutes. The Stone is charged throughout its two inch thickness, so that no compound is required at any time.

No metal or material will load the Stone, even stock removed from aluminum or carbon is easily wiped away with an oil wetted cloth. Reconditioning when required is easily done in your own shop.

Send for descriptive literature

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245 Waukegan Ave., Highwood, Illinois
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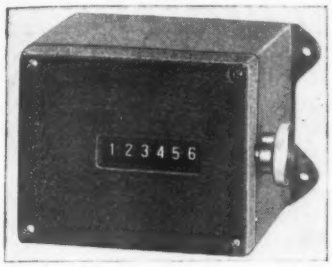
CIRCLE INFORM-A-GRAM KEY NO. 1804

An Enclosed Electric Timer with built-in heating element for use where dampness and temperature variations cause condensation and destructive corrosion, is announced



by Production Instrument Co., 714 W. Jackson Blvd., Chicago 6. The heating element maintains a temperature of approximately 125° within the enclosure.
Circle Inform-A-Gram No. A45.

The "Profilometer" Race-Groove Pilotor for measuring surface roughness across the raceways of small ball bearing races accommodates inner and outer races that range from

5/16" to 1" O.D. It also can be used for measuring on O.D.'s and I.D.'s of about 1/32" to ¼" radius. Mircrometrical Development Corp., 2821 S. State St., Ann Arbor, Mich.
Circle Inform-A-Gram No. A46.

"Metering Loader" handles parts as small as 1/16" thickness or diameter. 100 to 5,000 lbs per hr of miscellaneous small parts can be metered to any continuous appliance

through the use of a variable speed drive. Floor area required is 7' by 4½'. Industrial Heating Equipt. Co., 3570 Fremont Pl., Detroit 7, Mich.
Circle Inform-A-Gram No. A47.

SAVE COSTLY SET-UP TIME!
Instant Pin-Point Positioning with these NEW MAGNETIC BASE DIAL INDICATOR HOLDERS

ENCO TINY TITAN

"TINY-TITAN" No. 130

Magnetic Base Indicator Holder with Precision Adjustment

- √ New, 3-Step Universal Rod in 7/32, 1/4 and 5/16" diameters, for all indicators.
- √ Mounts to flat or down to 3/4" round surface, with 65 lb. pull.
- √ Adaptor permits full 360° adjustment in all directions.
- √ Many other new features.

PRICE: $9.50
Attractively Boxed.

Model 160 being used to indicate workpiece on Engine Lathe

A complete, new line of Precision Magnetic Base Holders and Lights that mount instantly to flat or down to ¾" round surfaces with pull from 65 to 125 lbs.

"TINY-TITAN" No. 160

Heavy Duty, Duplex Magnetic Base Indicator Holder with Precision Adjustment

- √ Magnetic pull, 125 lbs.
- √ Fool proof adaptor.
- √ Case non-breakable tenite, 1¼" x 4" x 1⅝" high.
- √ Jack type magnet release.
- √ 3-Step Universal Rod.

PRICE: $17.75
Attractively Boxed

Send for Bulletin No. 605, covering other Tiny-Titan tools.

ENCO MANUFACTURING COMPANY, Dept. 725
4520-26 W. Fullerton Ave., CHICAGO 39, ILL.
Sold all over the U.S. and Canada through Enco franchise dealers.

CIRCLE INFORM-A-GRAM KEY NO. 1811

90 FS Automatic Universal FLUTE GRINDER

←GRINDS TOOLS LIKE THIS FROM SOLID!

Make your own twist drills, spiral or straight reamers and end mills from solids on a production basis and save money.

Also avoid costly delays when special drills or reamers are required. Make drills as small as 1/16". Indexes automatically. No special skill needed.

Wardwell also manufactures automatic miller for spiral fluting.

Write for free descriptive bulletin No. 90 FS.

WARDWELL Manufacturing Co.
3809 Ridge Rd.
Cleveland 9, Ohio

Maker of largest line of saw and tool sharpening machines

CIRCLE INFORM-A-GRAM KEY NO. 1812

Specify DESTACO SHIM STOCK

Made from selected steel or brass, rolled to precision limits, oiled to resist stain and rust, free from burrs. Twelve assorted thicknesses .001" to .015", sheets 6" x 12", coils 120", identified every 6" by thickness and amount remaining on roll.

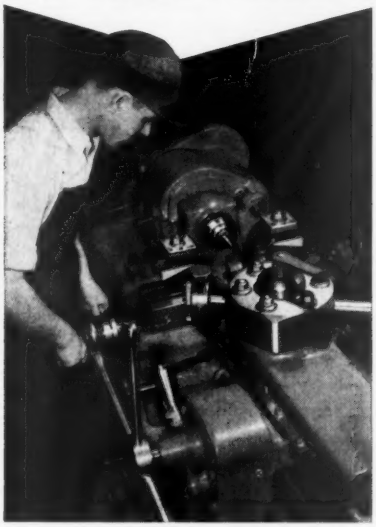
DESTACO DETROIT STAMPING COMPANY
844 MIDLAND AVENUE • DETROIT 3, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1813

A Better Value

SOUTH BEND

2-H TURRET LATHES



South Bend 2-H Turret Lathes have the stamina for exacting close-tolerance work, rigidity for producing fine finishes and ample power for smooth performance. Gear box provides 48 power feeds each for turret ram, universal carriage and double tool cross slide. Such a wide selection of feeds insures all-job range. Where can you find a better turret lathe value? Write for information on this fine machine.

SPECIFICATIONS

Spindle Hole—1¾". **Collet Capacity**—1". **Swing**—16¼". **Spindle Speeds**—20 to 945 r.p.m. **Turret Feed**—5⅞". **Dia. Turret Holes**—1½". **Thread Range**—4 to 224 per in. **Motor (2-speed)**—2, 1 h.p.

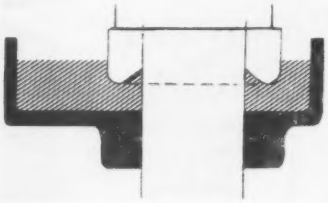
▶ **$3190** Illustrated, less electrical equipment, f.o.b. factory. Time payment terms available.

SOUTH BEND LATHE
SOUTH BEND 22, INDIANA

SOUTH BEND LATHES

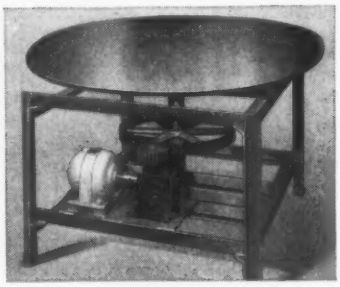
CIRCLE INFORM-A-GRAM KEY NO. 1821

A Flexible Reservoir Lubricator to prevent the seizing and galling of die set pins and bushings and provide long-time lubrication has been introduced by The Producto Machine Co.,



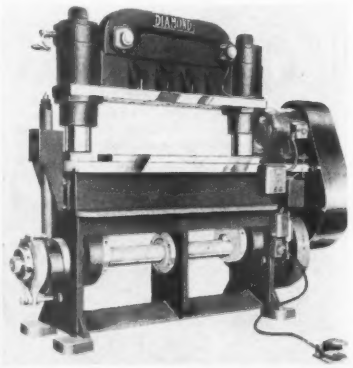
Bridgeport, Conn. The unit fits around the die set pin and the guide bushings are coated with lubricant as they dip into the reservoir with each stroke of the press.
Circle Inform-A-Gram No. A48.

Power Operated Turn Tables, adaptable to a wide range of uses in production, assembly, finishing, and inspection departments, are announced by Samuel Olson Mfg. Co.,



Inc., 2423-27 Bloomingdale Ave., Chicago 47, Ill. The turn table and motor with speed reducer are mounted on a welded steel frame designed for loads up to 1000 lbs.
Circle Inform-A-Gram No. A49.

A 50-ton Punch Press with bed area of 16" by 36" is added to the line of Multi-Max Punch Presses, manufactured by Diamond Machine Tool Co., 5111 Coffman-Pico Rd., Pico, Calif. Multi-Max presses are



designed for multiple and maximum stamping production and drawing up to 6" stroke. They are also used for conventional press brake work and power shearing.
Circle Inform-A-Gram No. A50.

Over 85% of the torque wrenches used in industry are

STURTEVANT

TORQUE WRENCHES

Read by Sight, Sound or Feel.

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

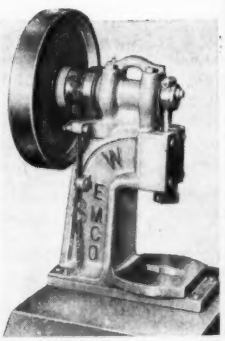
in inch grams...inch ounces...inch pounds ...foot pounds (All sizes from 0-6000 ft. lbs.)

Every manufacturer, design and production man should have this valuable data. Sent upon request.

P A STURTEVANT CO
ADDISON (QUALITY) ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1822

EMCO "W", 5-ton bench type; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.



EMCO

Power Punch Presses Are Speedy and Safe

Versatile EMCO presses excel for punching, forming, stenciling and riveting metal, leather, plastics and other non-metallic materials. Up to 300 operations per minute. "Big machine" speed, strength, rigidity, accuracy, endurance. Compact, foolproof; simple design—easy to operate. Thousands of EMCOS in money-making use testify to Klaas dependability since 1921. Two practical sizes.

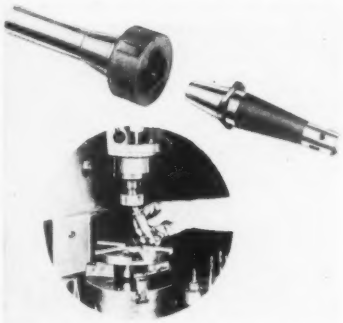
ASK FOR BULLETIN "T-2"

KLAAS MACHINE & MFG. CO.
4312 East 49th St., Cleveland 25, Ohio

— KLAAS BUILT —

CIRCLE INFORM-A-GRAM KEY NO. 1823

Quick Change Tools. V.S. (very small) series for small mill operations, can save up to 80% in machine downtime. Only ½" tool clearance is needed between the end of the tool



and the workpiece in order to change tools. Portage Double Quick Tool Co., 1046 Sweitzer Ave., Akron 11, Ohio, will supply additional information. **Circle Inform-A-Gram No. A51.**

A Rotary Electric Impactool with 25% more power has been developed by Ingersoll-Rand, 11, Broadway, New York. The Size 5U tool has a

½" drive and weighs 6½ lbs. With standard attachments it will drill, drive screws, ream, tap, etc. Free speed is 1900 rpm.
Circle Inform-A-Gram No. A52.

Large Circular Saw. M & M Model No. 5 high speed circular sawing machine with capacity for cutting 43" diameter aluminum billets features a steel gear case housing for a heavy duty helical gear train mounted on

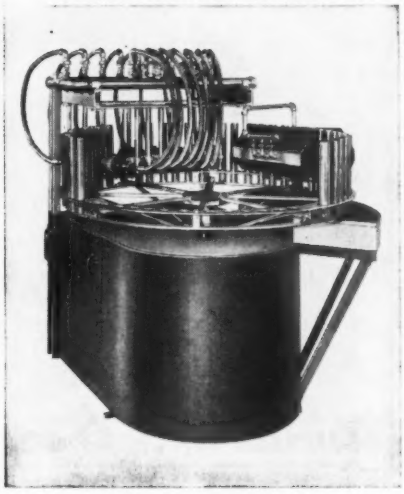
pre-loaded roller bearings. The variable saw feed is by a hydraulic cylinder. Motch & Merryweather Machinery Co., 888 E. 70 St., Cleveland 3, Ohio.
Circle Inform-A-Gram No. A53.

SPEED

G. A. S.
(Gas-Fired)
HIGH SPEED
HEATING UNITS

in Localized
BRAZING, ANNEALING,
HARDENING
(up to 3000 units per hour)

- Use city gas and air—equipped with high speed burners.
- Handle large variety of sizes and shapes. Available with stationary or rotating holding fixtures.
- Production rates as high as 3,000 pieces per hour.
- For further details on G.A.S. Turntable and Conveyor-Type Heating Units, write for Bulletin No. 511.



G.A.S. Turntable Heating Unit — annealing center sections of brass Tubes

GAS APPLIANCE SERVICE, INC.
Industrial Gas Engineers
1200 WEBSTER AVENUE • CHICAGO 14, ILLINOIS
CIRCLE INFORM-A-GRAM KEY NO. 1831

DEKA BORE
saves
80% of
boring time

DEKA-BORE (and only DEKA-BORE) can be adjusted in fractions of 1/10,000" on the full diameter as easily as reading 1/16" on a steel rule. NOT A VERNIER OR SCROLL ADJUSTMENT. Can be calibrated in increments of .00005 on radii or .0001 on diameter as easily as picking up .002 on a conventional micrometer dial.

100% GUARANTEED!

PRECISION TOOL & MFG. CO. OF ILL.
1305 South Laramie Cicero 50, Illinois TP-2
Gentlemen: Please send me
☐ Name of nearest DEKA-BORE distributor, who will arrange free demonstration.
☐ Free literature and prices.
NAME _____ TITLE _____
FIRM _____
ADDRESS _____
CITY _____ ZONE ____ STATE ____

CIRCLE INFORM-A-GRAM KEY NO. 1832

You take no chances when you choose .....

ROUSSELLE

... for it has the speed, accuracy and sturdiness you want — also the features to handle a greater variety of work — along with simpler, more thrifty operation and maintenance... Dollar for dollar you cannot buy a better, more practical press.

Significant savings are often achieved if you let our engineering staff assist you. There is no obligation.

Rousselle Presses are manufactured by
SERVICE MACHINE CO. 2310 West 78th Street • Chicago 20, Ill.

Rousselle Presses are sold exclusively through Leading Machinery Dealers

CIRCLE INFORM-A-GRAM KEY NO. 1841

HARDENED and GROUND HSS BLANKS

Any decimal diameter to ⅜"—in any length.
Mirror finish surface to gage tolerance.
Many uses —
—core pins, punches, gages, ejector pins, insert pins, special tools, etc. — Quick delivery.

Write or phone Millburn 6-4222 for price list D-3

WILLIAM T. HUTCHINSON CO.
P O B 328, UNION, N. J.
Factory: Springfield, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1842

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

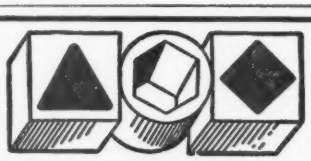
Write for sample on company letterhead
THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.

CIRCLE INFORM-A-GRAM KEY NO. 1843

MOISTURE CONTROL in Compressed Air

If you're having trouble with vapor, water, moisture, oil, rust, dirt, etc. in compressed air, let me tell you how a simple, inexpensive method renders air thoroughly dry, clean. More than a separator, it captures destructive vapor BEFORE it can condense when air cools at points of application. Many plants saving up to $140 per day in spraying, blasting, molding, drying, etc.; ideal for instruments. Write P. S. Becker, Engineer, 5778 Old Ridge Rd., Swanville, Erie 7, Pa.

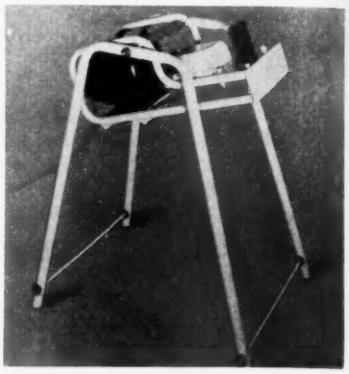
CIRCLE INFORM-A-GRAM KEY NO. 1844



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Penna.

CIRCLE INFORM-A-GRAM KEY NO. 1845

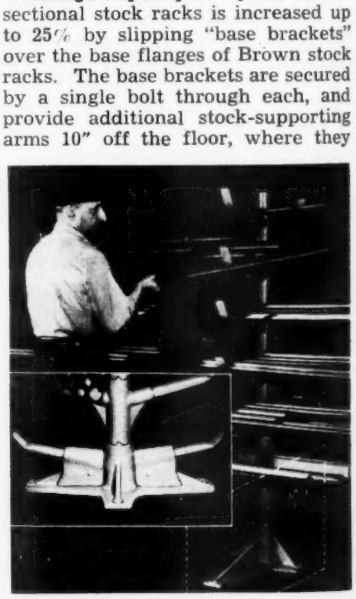
Scrap Chopper. This Britwell scrap chopper is suspended to float freely from its base, eliminating back pressure so the feed system through the press will not jam. Heavy duty cutters are interchangeable and the unit



has a capacity for stock up to 3" wide by 0.050" thick. A descriptive bulletin is available from Northeastern Development Engineers, 21 High St., Dept. 29, Pawtucket, R. I.
Circle Inform-A-Gram No. A54.

Dial Caliper. The "Dial-Cal" can be read instantly to thousandths of an inch without the interpolation of scales. A pointer and circular dial give direct readings to exact dimensions. Dial-Cal is manufactured by the B. & D. Tool Co., and is available from Precision Tool Sales, 417 E. Florence Ave., Los Angeles 3, Calif.
Circle Inform-A-Gram No. A55.

Storage Capacity in "Quick-Serve" sectional stock racks is increased up to 25% by slipping "base brackets" over the base flanges of Brown stock racks. The base brackets are secured by a single bolt through each, and provide additional stock-supporting arms 10" off the floor, where they

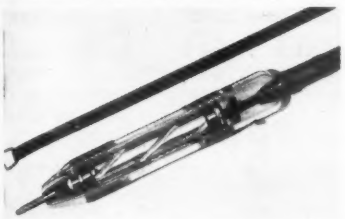


carry the heaviest materials conveniently. Used in groups of two or more, "quick-serve" racks provide efficient, orderly storage for long lengths of heavy bar, rod, pipe, etc. Send for Bulletin 26, Brown Engineering Co., 123 N. Third St., Reading, Pa., for complete information.
Circle Inform-A-Gram No. A56.

Plastic Tipped Mallets with an assortment of replaceable tips that will not mar metal or plated finishes are being marketed by Southwest Mfg.

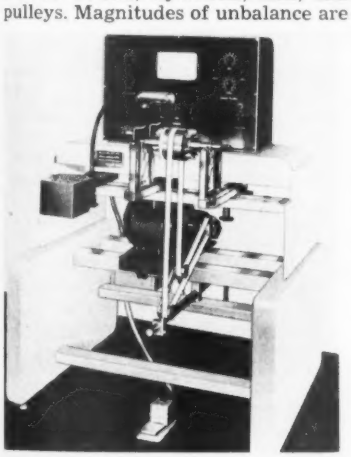
Co., 1615 E. First St., Santa Ana, Calif. The alloy mallet head is threaded at both ends; threaded tips are replaced by hand.
Circle Inform-A-Gram No. A57.

Pencil Grinder. This cutaway view shows details of the fingertip speed control and enclosed chuck on the improved model 100,000 RPM Pencil Grinder manufactured by the



NuJett Products Corp., 1355 Michigan Ave., Grand Rapids, Mich. In operation, air travels at high velocity through the rifled barrel and carries the fluted rotor with it.
Circle Inform-A-Gram No. A58.

Balancing Machines. Selected field installations in a variety of industries have demonstrated that the simplicity of operation of the Beko Balancer series insures ease of use by unskilled operators in balancing motor armatures and rotors, impellers, blower wheels, flywheels, fans, and pulleys. Magnitudes of unbalance are



positively indicated by a meter directly in terms of unbalance correction procedure selected. Three pushbuttons control all indications, including angular positions. Balance Engineering Co., MacDell Sales Div'n, 850 W. Lake St., Chicago 7, will send a permanent file folder on the machine.
Circle Inform-A-Gram No. A59.

Up to 60% Silver Brazing Savings with
NEW LM EDGEWOUND WASHERS

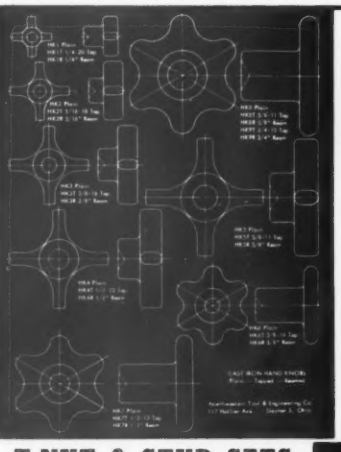
Now NO TANGLE - NOTCH COIL WASHERS SNAP OFF COIL PREPLACE ON WORK

★ Produced from standard wire stocks. No lead time needed for dies or exact strip.
★ Suitable for use with induction, gas-air, furnace, or any of the commonly used heating methods.
★ Available in EASY FLO and SILFOS as well as Copper, Bronze and other alloys.
★ Diameters up to 4" I.D., wire thicknesses from .010 upward.

FREE 10 page booklet gives you all the facts on better brazing with preforms. Write Today!

LUCAS-MILHAUPT ENGINEERING CO.
5056 S. LAKE DRIVE, CUDAHY, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1851



Free TRACING TEMPLATE COVERING 263 ITEMS IN FULL SCALE

QUARTER TURN SCREWS • SOCKET SHOULDER SCREWS • JIG FEET (three types) • FIXTURE KEYS (six sizes) • LATCH BOLTS (std. & long) SPHERICAL WASHERS • SPHERICAL FLANGED NUTS • STRAP CLAMPS (two types) • HARDENED NUTS & WASHERS • FLANGED NUTS N/C & N/F • CUT THREAD STUDS • TEE-NUTS (twelve sizes) • COUPLING NUTS • ADJUSTABLE STEP BLOCKS • STAR TYPE HAND KNOBS • HEXAGON TYPE HAND KNOBS • KNURLED HEAD SCREWS

T-NUT & STUD SETS
STEP BLOCK SETS
PUNCH PRESS SETS

Northwestern
116 HOLLIER AVE., DAYTON 3, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1852

IMPORTANT NOTICE
The Genuine MAUSER VERNIER CALIPER
IS NOW MADE OF STAINLESS STEEL THROUGHOUT
AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED
• HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
• SPECIALLY LONG VERNIER to read thousandths
• 3 GRADUATIONS - 1/1000" - 1/128" 1/10 mm in back

$14.75 PPD

Request illustrated folder showing complete line of MAUSER Toolmakers Calipers, Height Gages, Bevel Protractors and Tool Stands.

GEORGE SCHERR CO., Inc.
200-T Lafayette Street • New York 12, New York

CIRCLE INFORM-A-GRAM KEY NO. 1853

NOW TROUBLE-FREE deburring & countersinking

with the NEW FORD UNIFLUTE COUNTERSINK

Engineered for maximum efficiency with simple *single flute design*, FORD'S new high speed steel Uniflute *ends all deburring and countersinking troubles* on soft stringy steels, aluminum, brass, bronze, plastic, rubber, wood and other materials. FORD'S new HSS Uniflute covers a *wide range of hole sizes with one diameter tool.* Its cutting action is effective from the working point to the major diameter. Job-engineered shear angles allow superior free cutting, insure trouble-free action, even at higher speeds.

FORD regrinding service adds tool life, reduces tool costs!

FREE information · **Bulletin HSS 408** gives complete information about Ford's new Uniflute countersink, plus easy 4-step instructions on how you can resharpen the Uniflute in your own tool room.

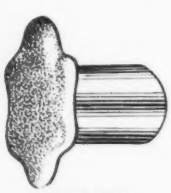
Catalogue No. 207 gives all facts on more than 277 FORD rotary tools including HSS ground cutters, rotary files, countersinks; CARBIDE cutters, end mills, grinding burs. **Send today!**

M. A. FORD MFG. CO., INC.
Pioneers in rotary tools for more than 30 years
817 W. River Street, Davenport, Iowa

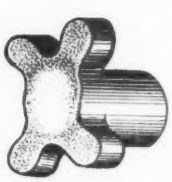
CIRCLE INFORM-A-GRAM KEY NO. 1861

REID QUALITY TOOL-ROOM ACCESSORIES AT MODERATE PRICES!

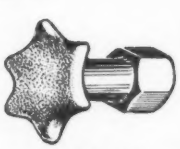
CAST IRON KNOBS



SCALLOPED



PRONG



LONG SHANK With Wrench Hexagon

Made in above three types and a wide variety of sizes. Designed to improve appearance of product. Well proportioned with eye appeal. Made of fine grain cast iron. Smooth finish. No sharp edges. Can be supplied drilled and tapped or drilled and reamed when desired. Low prices.

Also

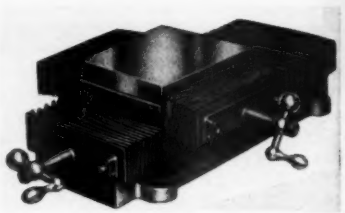
Get our low prices for plastic and steel ball handles, machine handles, compression springs, etc.

FREE! NEW 56 PG. CATALOG

REID TOOL SUPPLY CO. Muskegon Heights, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1862

Slides, Feeds, Tables. The compact, rugged design of the Standard Electrical Tool's redesigned line of slides, feeds, and tables accommodate weights from 5 lbs to 2500 lbs. They

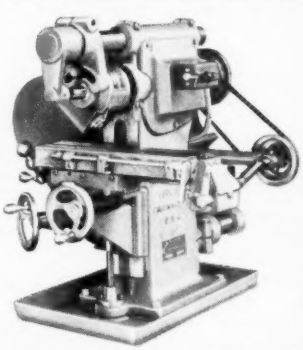


are available with single and/or compound transverse and 360° swivel. Illustrated is a compound feed with neoprene accordion slide protectors. Standard Electrical Tool Co., Mt. Hope & Sixth Sts., Cincinnati 4, Ohio. **Circle Inform-A-Gram No. A60.**

Prefab Storage Racks. Minimodules by Jarke Mfg. Co., 5407 Broadway, Chicago 40, easily combine together to form storage tiers which are expandable in width,

height, and length. They are made of heavy duty reinforced sheet steel and tubular, scientifically welded to provide maximum structural strength without bulk.
Circle Inform-A-Gram No. A61.

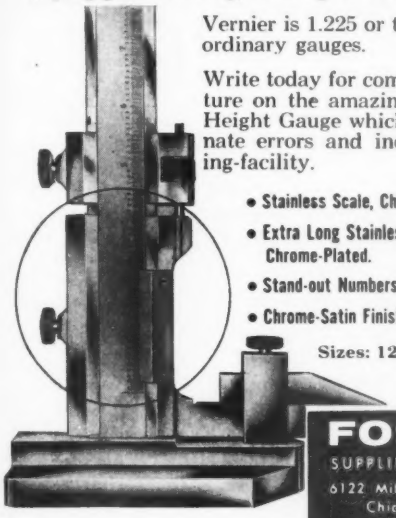
Bench Milling Machine. The new vertical milling attachment for U.S. Burke Bench milling machines is activated by helical gears, with both the spindle and drive arbor supported on pre-sealed precision roller bear-



ings. This permits the high spindle speeds required for optimum operation using small end mills. U.S. Burke Machine Tool Div'n, Cincinnati 27, Ohio, will supply additional information, or—
Circle Inform-A-Gram No. A62.

NOW Non-Glare SCALE and VERNIER with the FOSTER STAINLESS HEIGHT GAUGE

No more squinting, tilting to avoid reflection, magnifying-glass reading, causing undue eye-strain.



Vernier is 1.225 or twice that of ordinary gauges.

Write today for complete literature on the amazing FOSTER Height Gauge which will eliminate errors and increase reading-facility.

- Stainless Scale, Chrome-Plated.
- Extra Long Stainless Vernier, Chrome-Plated.
- Stand-out Numbers and Divisions.
- Chrome-Satin Finish Graduations.

Sizes: 12" to 48"

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SUPPLIES COMPANY
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CIRCLE INFORM-A-GRAM KEY NO. 1871

For stress, wear or vibration a

GRIPCO LOCK NUT

will hold tighter, wear longer, cost less!

The Gripco Lock Nut, with its simple, one-piece design, has given industry a tighter, more positive holding action for quicker fastener application at less initial cost. It provides frictional resistance to vibration and loosening torque—is faster to use—permits repeated removal and reapplication—simplifies production—lowers manufacturing and maintenance costs—has improved the durability of hundreds of products—and has insured greater customer satisfaction. If stress, wear or vibration is your problem, specify Gripco Lock Nuts for greater holding power. Impervious to oil or water. Write for samples and full details.

GRIPCO PRODUCTS INCLUDE: Gripco Lock Nuts, New Gripco "Clinch" Nuts, Gripco Hi-Nuts, Gripco Pilot-Projection and Countersunk Weld Nuts with or without Gripco locking feature.

104

GRIP NUT COMPANY
"after 50 years still holding strong"
308-W S. MICHIGAN AVE., CHICAGO 4, ILL.

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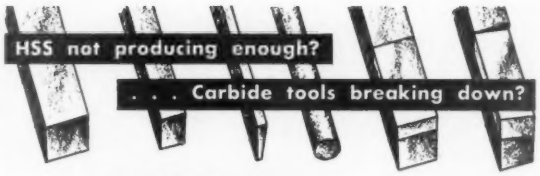

Use CROBALT cast alloy tools!

CROBALT cast alloy cutting tools outwear and outproduce HSS . . . withstand shock and vibration far better than carbides . . . give 15% to 35% more pieces per grind than other cast alloys! They've been proven through 23 years in the largest metal-working plants; and today they're better than ever. Try them and see!

FREE CROBALT BULLETIN
describes the conditions where cast alloy tools are BEST — and tells how to use them to full advantage. In it, you may find the way to higher production at lower cost. Write for *Bulletin 101*.

DISTRIBUTORS: We invite your inquiries.

Crobalt, Inc.
2800 S. State St., Ann Arbor 5, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1872

ANNOUNCING
A NEW LOW COST *Impact* AIR HAMMER

CUTS COSTS AMAZINGLY IN

- ASSEMBLING
- EMBOSSING
- FORMING
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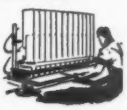
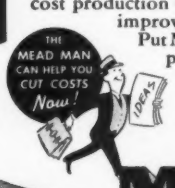
- FORGING
- MARKING



Most jobs done on expensive, heavy presses can *now* be done faster and cheaper by the light low-priced Mead Air Hammer using the new adjustable, spring*less* "Bullet Velocity" MEAD AIR TRIP! It delivers blows equivalent to 7½ tons down to as little as a few ounces—at several blows per second, if desired! Enjoy the *competitive benefits* of really low cost production with durable, powerful, improved Impact Air Hammer. Put Mead "how-to-do-it" experience to work for you.



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MEAD
MEAD SPECIALTIES COMPANY
4114 N. Knox Ave., Dept. HA-25, Chicago 41, Ill.

Pathfinder in AIR POWER AUTOMATION

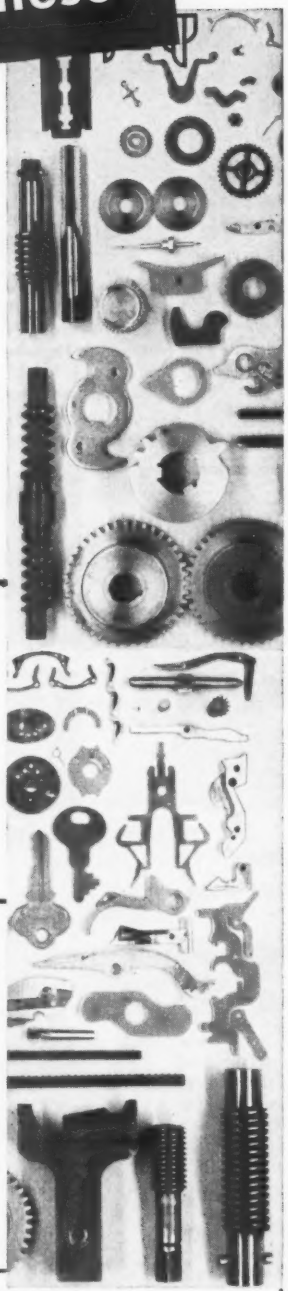
CIRCLE INFORM-A-GRAM KEY NO. 1874

HOW you can meet close tolerances on parts like these!

1

Bausch & Lomb BENCH COMPARATOR

Save every way! No costly holding fixtures needed for most work. No time-wasting set-up. Easy operation quickly provides vivid screen image, reveals costly production errors. Micrometer stage (optional) reads to .0001".



2

Bausch & Lomb CONTOUR MEASURING PROJECTOR

Quickly, easily shows sharp silhouettes or detailed surface views on 18" screen . . . for inspection, comparison, or highest precision measurements. Linear readings to .0001"; angular, to 1 minute of arc.

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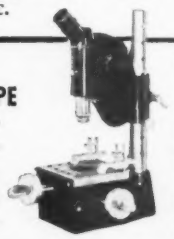


Bausch & Lomb TOOLMAKERS' MICROSCOPE

Quickly measures or inspects opaque or transparent objects of any contour. Linear readings to .0001"; angular, to 1 minute of arc.

SOLD AND DISTRIBUTED EXCLUSIVELY BY THE DoALL COMPANY For full information call your local DoALL Sales-Service Store, or write: The DoALL Company, 254 N. Laurel, Des Plaines, Illinois.

BAUSCH & LOMB

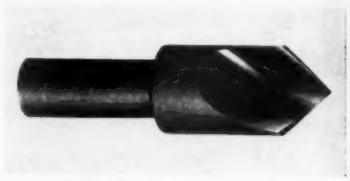
SINCE B&L 1853

Quality Control

INSTRUMENTS

CIRCLE INFORM-A-GRAM KEY NO. 1881

A New Uniflute Countersink, employing simple single flute design and covering a wide range of hole sizes with one diameter tool, has been engineered by the M.A. Ford Co.,



817 W. River St., Davenport, Iowa. The tool's cutting action is effective from the working point to the major diameter; a 1" O.D. tool is effective from 1/16" to 1".
Circle Inform-A-Gram No. A63.

An Electronic Micrometer capable of automatically controlling a grinding machine's cycle and guaranteeing tolerances as low as 0.00004" is being offered by the Electro-Autosizing Machine Div'n of Industrial Gauges Corp, Englewood, N. J. The standard Model CG-2 Electro-Autosizer is

about the size of a shoebox, is self-compensating for wear and outside influences such as temperature and moisture changes, and can withstand rough handling. Setup time is approximately 15 min. Various types of measuring heads are available.
Circle Inform-A-Gram No. A64.

The "Vac-Lift" vacuum cup lift provides a safe method for handling flat, non-porous materials. It will not mar critical surfaces, and will not crush or distort fragile workpieces No special vacuum system is needed

for the unit; the air that operates the "Air-Bloc" hoist creates the vacuum. Contact the Ingersoll-Rand Co., 11 Broadway, New York 4, for further information.
Circle Inform-A-Gram No. A65.

SHALLOW HOLES . . . DEEP HOLES
DRILL THEM *ALL* FASTER, BETTER
WITH A *Commander*

DRILL CHIP BREAKER

✓ Small Chips Permit 50% — 400% Increase in Drilling Speeds
✓ Drill 10 Diameters or More in Depth Without Clearing Drill
✓ Better, Smoother, More Accurate Holes

Reciprocating action of the Commander Drill Chip Breaker breaks chips into small pieces that travel up drill flutes . . . permitting higher drilling speeds . . . doubles and triples production of shallow OR deep holes. Long chips which cause drill breakage, scored holes, slow jig and fixture loading, are eliminated—small, easy to handle chips flow up out of hole continuously, permitting coolant to reach cutting edge of drill. Assures longer drill life, more holes per sharpening, more holes per hour.

Your nearby COMMANDER Distributor has the Drill Chip Breaker and other Commander Production Tools.

ORDINARY CHIPS

CHIP BREAKER CHIPS

Write FOR CATALOG which describes Commander's Production Tools

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4228 W. KINZIE STREET
CHICAGO 24, ILLINOIS

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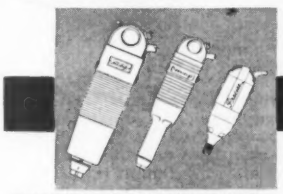
Precise
LOWEST COST PRECISION

UP TO 45,000 R.P.M. AND ¼ H. P.
ON AC/DC FOR TOOLROOM AND PRODUCTION

Only PRECISE has the speed, power and precision needed to turn *Tungsten Carbide Mills* as well as all other rotary tools with shank diameters to ¼". Grind, mill, finish, polish any material from wood to the hardest alloy steel. MODELS SUPER 30 and SUPER 40 are for hand applications or machine set-ups; PRECISE SUPER 50 is for heavy duty in machine set-ups. Precision quills and chucks; lifetime-lubricated, micro-precision bearings; machined metal housings. Mounts and accessories for each model extend versatility on standard machine tools.

SUPER 50 POWER QUILL



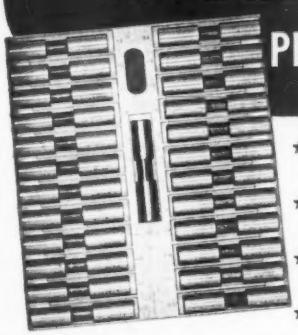
Three PRECISE Models for Today's High-Speed Tools and Techniques.

Call Your Industrial Distributor or Write for Catalog.

PRECISE PRODUCTS CORP., 1341 Clark St., Racine, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 1892

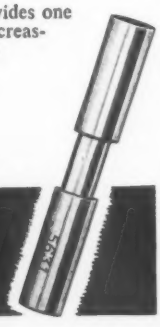
CLOSER TOLERANCES
with DELTRONIC TENTH PLUG GAUGES



★ Size variation by ten thousandths
★ Set of 25 costs approximately same as Go and No-Go gauge.
★ Available in increments of 1/64" from 1/8" to 1"
★ Hardness is Rockwell C62/C64

This new system of precision gauging provides one gauge of nominal size plus 12 gauges of increasingly larger sizes in .0001" increments and 12 gauges of decreasingly smaller sizes in increments of .0001". Each gauge is identified. It is the same size on both ends to double the life in usage.

For further information write Dept. D1.



DELTRONIC CORPORATION
1507 RIVERSIDE DRIVE • LOS ANGELES 31, CALIF.

CIRCLE INFORM-A-GRAM KEY NO. 1893

Solves any eyeleting problem!

Edward Segal
AUTOMATIC EYELET ATTACHING MACHINERY

Model NR
Bench Type *(Illustrated)*
Stroke 2¾". Depth of throat (end ram to frame) 7¾". Adjustable horn provides ample space for special feeds, fixtures and indexing mechanisms.
Model XNR same as above for hand-feed staking operations, 1½ & 2 ton capacity.

Whatever the size and the materials there's an Edward Segal precision-built machine to do a cost reducing, time saving job on your eyeleting assembly . . . For single or multiple settings. Interchangeable raceways, rams and tool holders give these machines amazing versatility. In constant use in hundreds of plants in all fields.

Submit your specs to us for analysis without obligation, and write for our interesting booklet loaded with eyelet setting data — Bulletin M 72

EDWARD SEGAL • 72 SPRING STREET • NEW YORK 12, N. Y.

EDWARD SEGAL EYELET ATTACHING MACHINERY
SPECIAL HOPPERS AND FEEDING DEVICES

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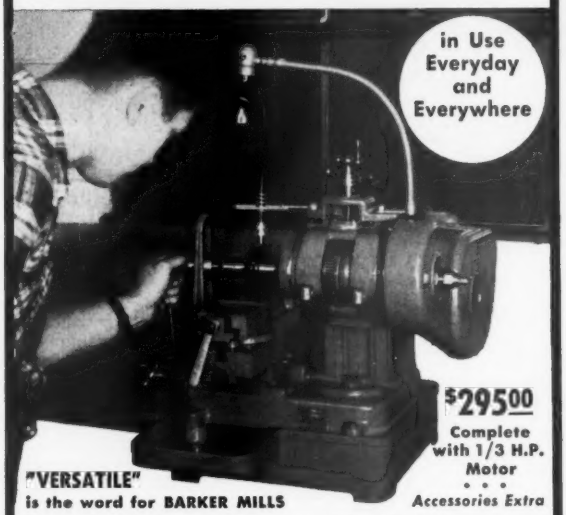
★ MORE BARKER MILLS in MORE PLANTS on MORE JOBS



$295.00 Complete with 1/3 H.P. Motor

"VERSATILE" is the word for BARKER MILLS

Accessories Extra

Tested Design and Unusual Operational Features are Boosting Barker's Popularity with machinists and plant executives by leaps and bounds. More than a thousand in use already in diversified industries and on various machining operations. Satisfaction that prompts repeat orders is one of our strongest claims. Investigate the BARKER before you buy. We know the BARKER MILL can work wonders in your tool room or on your production line.

Write for Details. BARKER ENGINEERING CO. 800 GREEN ROAD CLEVELAND 21, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1901

Geneva Dial Indicators for Precision Production

Test Sets for Machinists, Tool Makers and Inspectors

.001" .0005" .0001" Dial Indicators with Exclusive lever action

Since 1896, Geneva Precision Instruments have been used for precise checking.

Complete line includes:

Dial Indicators — Test Sets
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16-page illustrated Catalog 106 sent FREE on request.

CHICAGO DIAL INDICATOR CO.

DEPT. A, 180 N. WACKER DRIVE, CHICAGO, ILL.

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SURE WISH I'D 'A' GOT ACE DRILL BUSHINGS

MORAL: FOR BETTER BUSHINGS- *Always Specify ACE!*

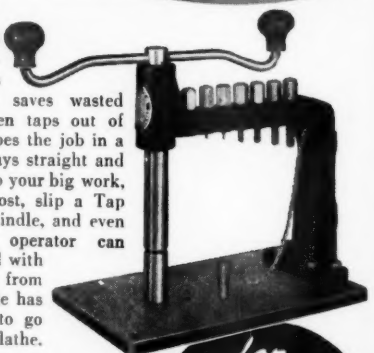
LARGEST *DELIVERABLE* STOCKS ANYWHERE

ACE DRILL BUSHING CO., INC.
5407 Fountain Ave., Los Angeles 29, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1903

TAP BREAKAGE Reduced

The DAHLSTROM TAP GUIDE practically eliminates tap breakage and saves wasted hours getting broken taps out of expensive dies. It does the job in a jiffy with work always straight and true. Carry it over to your big work, or fasten it to a post, slip a Tap Adaptor into the spindle, and even an inexperienced operator can handle it. Equipped with 9 adaptors, ranging from 8-32 to ¾". Spindle has center in top end to go in tail stock of lathe. Or use it as a tap extension for hard-to-get-at-places.



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$59.50 F.O.B. FACTORY

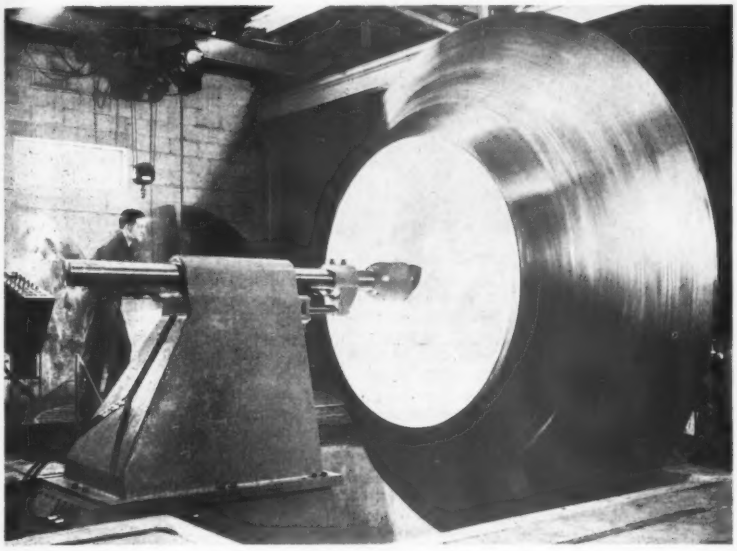
for HAND TAPPING or LATHE USE

BRANCH MFG. CO.
NORTH BRANCH, MINNESOTA

Dahlstrom TAP GUIDE

CIRCLE INFORM-A-GRAM KEY NO. 1904

EXTRA-LARGE SHAPES ARE SPUN ON GIANT LATHE



Extra-large and heavy sheet metal shapes may now be spun, using the huge 180″ diameter swing spinning lathe recently designed, built and installed by The Phoenixspun Division of Phoenix Products Company in Milwaukee. It is believed to be the world's largest horizontal spindle lathe designed specifically for spinning metal.

The new machine will meet the need for larger spun shapes currently required in atomic energy plants and industrial air-conditioning equipment, and will open up new design possibilities.

Previously, the industry was unable to spin shapes over 104″ in diameter. Even within that range, welded sheets must be used. Sheet metals are normally available in 72″ and 85″ maximum widths, and careful welding is required to produce the required blanks for spinning.

Maximum conventional spinning does not normally use metal over ⅛″ thick and, depending on the metal, does not spin shapes over 26″ in depth. With the new machine, it is now possible to go as heavy as ⅜″ steel and ¾″ aluminum and up to 72″ in depth.

The new machine is designed to provide plenty of power for spinning such tough metals as the stainless steels, chrome-moly steels, cupro-nickel alloys, and the new titanium alloys.

The entire operation of the lathe is electrically controlled from a portable control panel. From here is controlled the speed of the 50-hp drive, the clutches, brakes, and hydraulically-operated movements of the tailstock.

The large white disc shown in the photo is the follow block that clamps the sheet material against the spinning mandrel or chuck. The follow block is centered and supported by a large "live center" on the tailstock.

Three spinning tool setups provide a choice for handling a large range of work. Spinning can be done manually, using a conventional lever-type tool; also by a manually-controlled hydraulic tool; and third by a semi-automatic, hydraulically-actuated tool.

The headstock, providing the power to turn the spinning chuck, has an ac/dc variable speed motor driving through gear reducers and air-actuated clutches. Silent type chain drives are used to connect the motor to the reducers, and the reducers to the lathe spindle. Chain drives are enclosed and force feed lubricated.

The original gearing arrangement permits the spindle speed to be varied from zero up to 400 rpm, although higher speeds can be readily attained by modification of the gearing.

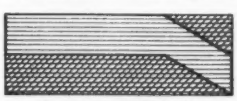
MODERN FORGED HIGH SPEED STEEL TOOLS ARE Guaranteed TO

√ Last Longer
√ Cut Faster
√ Outperform ALL OTHER HIGH SPEED TOOLS—

AND HERE'S THE REASON WHY!

Forging produces a stronger, better cutting tool than any other method for these reasons:

FORGING... increases impact strength!
FORGING... guarantees uniform hardness!
FORGING... controls grain flow!



A Conventional HSS tool. Maximum Rockwell 65.

Drawing A shows conventional high speed steel tool machined from blank. Note parallel grain structure which weakens tip of tool causing speedy breakdown of cutting surface.

B Forged HSS tool. Rockwell up to 69.

Drawing B shows same tool forged. Grain structure gives maximum strength, cutting is done with side grain guaranteeing increased tip strength, much longer tool life.

Forging by its very nature produces a tougher tool—the difference in Rockwell hardness possible by forging can by itself result in more than doubling tool life—and in addition the grain structure contributes overall tool strength—giving a far superior cutting edge for longer runs between grinds and finer finishes.

That's why we say MODERN Tools are *guaranteed* to outperform any HSS tool you are using now!

SEND FOR prices, literature and drawings on many standard Forged Tools available—send specifications for quotations on special forged tools!

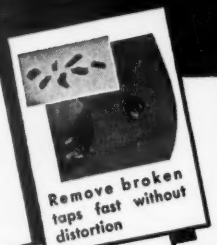
DO IT TODAY!

NELCO TOOLS
MODERN TOOLS DIVISION
NELCO TOOL CO., INC., BERLIN, CONN.

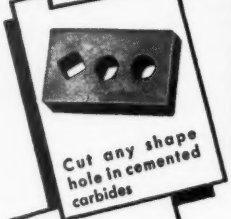
CIRCLE INFORM-A-GRAM KEY NO. 1911

METAL DISINTEGRATION

and what it can do for you



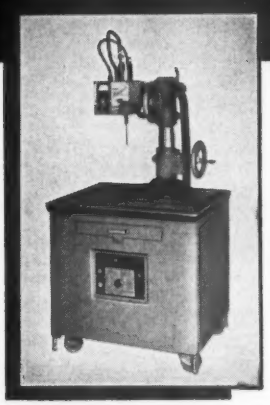
Remove broken taps fast without distortion



Cut any shape hole in cemented carbides

Cut dovetails in hardened dies

Cut oil holes in hardened gears without annealing



Literally hundreds of thousands of dollars are saved annually by corporations that are using Metalmasters in just tool and die repair alone.

There's a technical engineer in your area to give you an on-the-spot demonstration in your own plant at your convenience. (NOTE: It is not uncommon to pay for a Metalmaster with just one short demonstration through savings on workpieces.

There's a Metalmaster designed for your operation and priced to fit your needs. For information as to the many uses and benefits Metalmaster can offer you, write today on your company letterhead to:

Metalmaster

DIVISION OF CLINTON MACHINE COMPANY

CLINTON, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1921

Drill Hardened Steels without Annealing –

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It—
With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1368 East 222nd St. • Cleveland 17, Ohio

Also makers of—
BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS
Write for information

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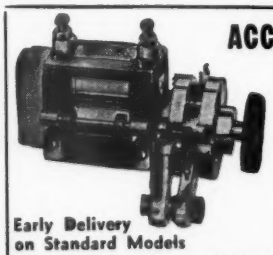
Expanding Mandrels

Accuracy 001" - No Distortion
No Slipping - Everlasting

K. O. LEE CO.
ABERDEEN, SOUTH DAKOTA

If it's made by **Lee** *it's a* **"Knock-Out"**

CIRCLE INFORM-A-GRAM KEY NO. 1923



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Models to fit:
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Early Delivery on Standard Models

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Write for descriptive literature TODAY

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An Electrix Affiliate

CIRCLE INFORM-A-GRAM KEY NO. 1924

CARBIDE STEP MILL SAVES TIME ON 13-FT STEEL SPARS

Milling 2¼" x 3" offsets, 156" long, in aircraft spars at Fred N. Wells Inc. of Los Angeles, Calif. is today being done in only one pass with step mills utilizing tungsten carbide-tipped inserted blades. Heretofore, with high-speed steel cutters, five passes were required. In addition, the operation is now performed at increased speed with resultant longer life between cutter regrinds.

Photo courtesy Kennametal Inc.

This hogging cut is made on two SAE 4140 (normalized) steel bars at one time, using left and right-hand cutters on an old 20-hp Ingersoll double-side head planer mill. To obtain a higher operating speed for the most efficient use of carbide cutters, roller bearings were installed in each side head-spindle. Prior to offset milling, the sides of each bar are face milled to remove any adhering forging scale.

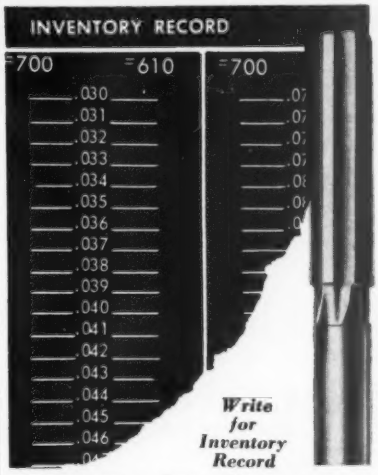
With the 6" dia. high-speed steel shell mills run at 2.5 ipm, 44 rpm, and ½" x 3" cut, milling time for two bars was formerly 20 hrs. This operation is now performed in only 3 hrs with a cutter similar to a standard style 4"-50 step Kennamill. They use 5" dia. left and right-hand step mills, each having four brazed inserted-blades which are carbide tipped with Grade K2S Kennametal of 3/16" x ½" x ¾". All blades have a 7° negative radial rake; a 10° positive axial rake on blades 1 and 3, and a 10° negative axial rake on blades 2 and 4. Each blade takes a proportionate amount of the total 2¼" wide cut at 1⅛ ipm and 160 rpm. Chip-load is 0.007" per tooth.

Climb milling is used to within 3" of the bar ends, after which the ends are cut off. (Enough surplus length permits sawing bar stock to finished length.) This method is used because the machine has no backlash control on its feed gear.

Formerly each h.s.s. cutter required three regrinds to mill one piece at a cost of $30.00. With the carbide cutters two bars are milled, then cutters are reconditioned. To regrind the removable carbide blades — done on a conventional offhand tool grinder — requires only 30 mins. per cutter.

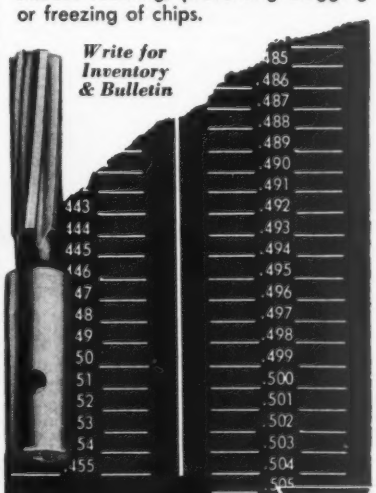
Thus the switch to inserted carbide blades on this job stepped up production and provided a substantial reduction in this plant's cutter-grinding cost.

Twentieth Century
MANUFACTURING COMPANY
...has the World's greatest STOCK SELECTION of CHUCKING and STUB DECIMAL REAMERS SIZES!



WHY BUY a decimal reamer as a SPECIAL — when you can buy the SUPEREAM DECIMAL REAMERS from STOCK for immediate delivery — *YOU SAVE BOTH TIME and MONEY.*

• All flutes are ground on face and back *AFTER* heat treatment for remarkably smooth reaming, preventing clogging or freezing of chips.

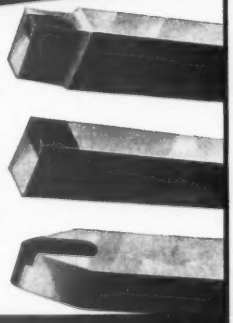


In emergency telephone:
LIBERTYVILLE 2-4200

TWENTIETH CENTURY MANUFACTURING CO.
ROUTE 176 and BRADLEY ROAD
BOX 429TP LIBERTYVILLE, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1932

USE WILLEY'S GENERAL PURPOSE TUNGSTEN CARBIDE TOOLS!



Standard tools are available either from stock or on delivery dates that meet your schedules. Advance orders for shipment on definite dates help tremendously in serving you better. Send prints for quotes and delivery dates on special tools.
Catalog gives full information on standard tools and blanks, as well as gages, centers, broaches, drills, centerless grinder rests, diamond tools and other special production tools.

WILLEY'S CARBIDE TOOL CO.
1340 W. Vernor Highway, Detroit, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1931

Integrity

THE INDISPENSABLE INGREDIENT OF D.T.R.

DIAMOND ABRASIVE COMPOUNDS

THE *Integrity* of D.T.R. is your assurance of uncontaminated *virgin diamond* boart imported by us directly from London . . hand-crushed into efficient sharp edged *blocky shapes* . . . centrifuge graded for *absolute accuracy* of particle size . . . and borne by an exclusive *non-drying* vehicle* which saves diamonds through better adhesion.

Ask for complete specification folder and price list. Discounts for bulk users.

* PATENT PENDING

INTRODUCTORY SAMPLE KIT . . . $22.50

Nine ½ gram jars (grades 0-2 through 120 grit) on plastic palette, with 4 oz. bottle of extender.

DTR DIAMOND TOOL RESEARCH CO., INC.

380 Second Ave., N. Y. 10, N. Y. • GRamercy 5-3530

Specialists in Industrial Diamond Products

CIRCLE INFORM-A-GRAM KEY NO. 1941

ELASTICONE® GUIDE PIN COVERS

CUT DIE COSTS 25%

Low-costing Elasticone Guide Pin Covers reduce die breakage; protect man & machine — closes the gap between pins and bushings.

Just snaps into place—no installation costs. Manufactured in stock sizes.

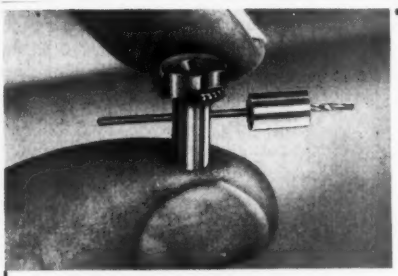
Write for full information and literature.

CENTRAL

2210 EAST HUNTINGDON ST. PHILA. 25, PA.

CENTRAL SAFETY EQUIPMENT COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 1942



WITH MICRO DRILL GUIDES

Special Holes ARE STANDARD!

No change in price or delivery for metric and special hole sizes in STANDARD MICRO DRILL GUIDE RANGE OF #80 to 3/32" in listed body sizes.

PLUS . . .

CLOSER ACCURACY

.0002 tolerance on I.D., O.D., and concentricity.

FASTER DELIVERY!

Commonly recurring sizes are stocked finished. Also complete stock of 75 semi-finished standard body styles and sizes—ready for completion.

Orders marked "Special Rush" receive priority handling.

LONGER LIFE

No counter bore . . . diamond lapped hole with full length drill bearing.

ALSO AVAILABLE

Special Micro Drill Guides with body sizes other than those listed and hole sizes not in the standard #80 to 3/32" range.

Job micro-drilling of your parts.

Engineered MICRO-TOOLING, drills, jigs, collets, etc.

MICRO DRILL GUIDE

DIVISION JESSOP ENGINEERING AND DEVELOPMENT COMPANY

3980 SUPERIOR AVENUE JEDCO CINCINNATI 36, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1943

STRIKE!

Hannifin's New Square Type Air and Hydraulic Cylinders Are Right "Down Your Alley"!

Every Engineer will want data on these two new lines of cylinders incorporating the BIGGEST IMPROVEMENT IN CYLINDER DESIGN IN THE LAST 50 YEARS!

WRITE FOR

BULLETIN 113
Hydraulic Cylinders 2000 p.s.i.—3000 p.s.i. (non-shock)

BULLETIN 213
Fluid Power Cylinders 200 p.s.i. (air or oil)

HANNIFIN

Hannifin Corporation, 563 South Wolf Road, Des Plaines, Ill.

Air and Hydraulic Cylinders • Presses • Air Control Valves

CIRCLE INFORM-A-GRAM KEY NO. 1944

PMI Announces Spring Meeting

The Pressed Metal Institute will hold its 6th Annual Spring Technical Meeting at Hotel Carter, Cleveland, O., on March 16-18. "The Inside Story of Metal Stampings" will be the conference theme as announced by Mr. Warren Peterson, Chairman of PMI's Technical Research and Standards Committee.

A panel of experts will discuss the running of a stamping job from both the short and long run angle in a small press shop as well as a large metal stamping plant. Estimating, safety, production scheduling, new techniques, and developments as related to the stamping industry will be featured topics at the sessions.

The committee has arranged plant tours for the delegates through The American Stamping Company and the HPL Manufacturing Company.

The meeting is open to all people interested in the metal stamping industry.

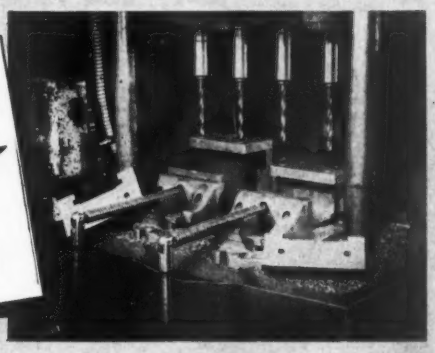
Development of Metal Forming Traced in Movie

"Precision Metal Forming," a color movie, traces the development of the Radial Draw Former, a machine which combines the principles of rotary stretch and rotary compression forming.

The 31 minute movie produced by Edward Feil Productions of Cleveland for The Cyril Bath Co., 32380 Aurora Rd., Solon, Ohio, shows how the latest model former, equipped with a traversing compression unit which "irons" the part being formed against a die, is used to produce rings, arcs, long sweeping curves, angle changing, and multi-plane parts in stainless steel, high tensile aluminums, and other modern metals for aircraft, jet engine, and guided missile parts.

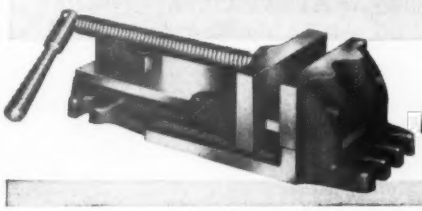
Parts are formed to machining tolerances while eliminating chip wastage of high-priced and scarce materials, when the radial draw process is used.

Here's PROOF that -SPEED VISE- is a fast production tool



Here's a production set-up on a multiple spindle semi-automatic drilling machine that is really cutting manufacturing time and costs. The use of two Speed Vises eliminates the need for expensive and complicated fixtures and at the same time increases the production range. With Speed Vise it is only necessary to make a simple jaw plate to fit the parts being machined and to hold drill bushings, etc.

★ Quick action design for speed. Opens instantly to full capacity to handle work of any size.
★ Standardized holes for attaching jigs or jaw plates.
★ Lift...slide...lock...that's all there is to the fast, positive locking action.
★ Heavy, semi-steel castings for extra strength and a heavy base plate for rigidity.

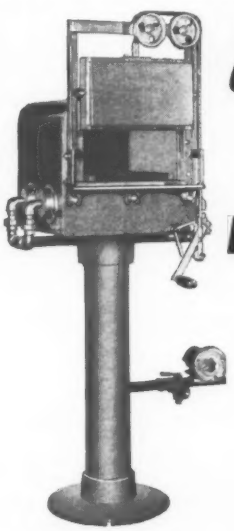


Write now for Bulletin 30-AM

CARDINAL MACHINE COMPANY

1819 Dana Street, Glendale, California

CIRCLE INFORM-A-GRAM KEY NO. 1951



SAVE HOURS CUT HEAT TREATING COSTS

Save time, save gas . . . heat treat carbon and high speed steels, dies and tools with JOHNSON 142. Powerful burners provide fast, uniform heat. Gets the job done while other furnaces are still warming up. Temperatures easily regulated. Firebox 7" x 13" x 16½" lined with high temperature refractory. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

For temperature range 1300° to 2350° F....$325.00

F.O.B. Factory

Models available in smaller firebox sizes. Write for Free Catalog.

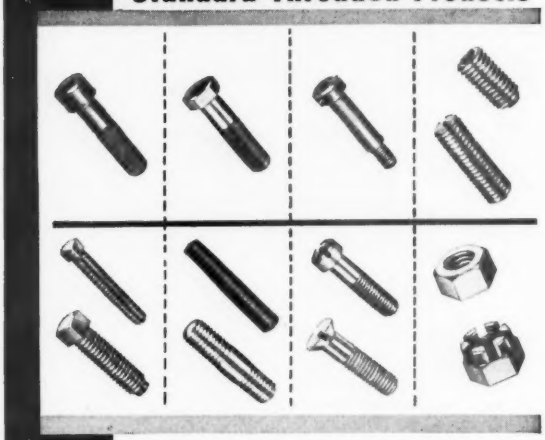
JOHNSON GAS APPLIANCE CO.
575 E Ave. N.W., Cedar Rapids, Iowa

Quick Acting JOHNSON No. 142 Hi-Speed Furnace

JOHNSON Since 1901 **FURNACES FOR INDUSTRY**

CIRCLE INFORM-A-GRAM KEY NO. 1952

Cut Assembly and Production Costs with "CHICAGO" Standard Threaded Products



For whatever purpose, production or maintenance, "Chicago" Threaded Products for 82 years have been precision made to assemble faster with less "on the job" trouble.

Specify standard sizes for faster deliveries, greater savings over "specials" and less downtime. Our more complete stocks mean "at once" shipments when you need them—no production delays—no maintenance "shut downs"—no large inventories necessary.

The "Chicago" line of threaded products is a complete line, available from the stocks of your service-conscious Industrial Supply dealer—in bulk or in packages for original equipment or replacement. Ask him for samples—he will gladly supply them.

This new 36-page catalog tells the whole story of the "Chicago" complete line of threaded products. Ask for your copy today.

All "Chicago" Screw Products come packed in strong, easier-to-see packages. Color coded labels mean faster selection, greater savings of time in your stockrooms.

HIGHLIGHTS OF THE "CHICAGO" LINE:

★ High Carbon Heat Treated Cap Screws give added wearing qualities due to uniform hardness through entire thread structure. Ideal for all heavy-duty equipment.

★ Larger size Hexagon Head Cap Screws than normally stocked are available for immediate shipment.

★ Anti-corrosive "Chicago" stainless steel and brass fasteners in a large range of sizes and styles available for immediate shipment.

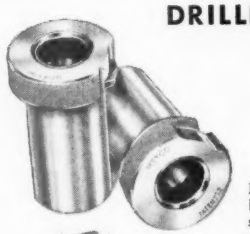
The CHICAGO SCREW COMPANY

2519 W. Washington Boulevard
Bellwood, Illinois

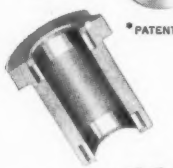
"SAFETY PLUS" Socket Set Screws, alloy and stainless • Socket Head Cap Screws, alloy and stainless, Flat Head, alloy • Socket Head Stripper Bolts • Socket Pipe Plugs • Square Head Dog Point Set Screws • Socket Keys and Key Kits • "CHICAGO" Hexagon Head Cap Screws, bright, heat treated, stainless and brass • Square Head and Headless Set Screws • Fillister and Flat Head Cap Screws • Milled Steel Studs • Hexagon Nuts, steel and brass • Castle Nuts • Taper Pins

CIRCLE INFORM-A-GRAM KEY NO. 1961

INCREASE PRODUCTION.. SAVE TIME & MONEY ON YOUR DRILLING OPERATIONS



*PATENTED



MEYCO

Carbide Inserted Bushings last longer, cost less in the long run

Here is a bushing that combines the best features of steel and carbide; the strength of steel and the long life of carbide. First cost: slightly higher than ordinary steel bushings; their life: many, many times as great. In addition to such obvious savings, MEYCO bushings increase the life of drills and reamers, produce accurate work for a longer period of time, save on machine-down time and on nonproductive man-hours.

☆

Auto manufacturer says: "... the steel bushings previously used averaged about 28 hours life. MEYCO bushings ran 1,168 hours before they were unusable."

For information and prices write for Meyco Bushing Catalog No. 41

W. F. MEYERS CO., INC., BEDFORD, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 1962

A NEW TYPE WALTER PRECISION DIVIDING HEAD

- Operates Horizontally, Vertically.
- Easy Handling.
- For Quick, Plain and Degree Indexing.
- Versatility Increased by Various Accessories.
- High, Long-Lasting Precision.

Model SHU

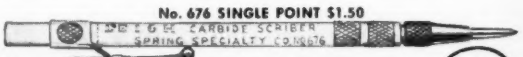
Each tool supplied with individual test report. Maximum permissible error chart supplied with literature.

Sole Agents

KARL A. NEISE | 404 4th Avenue, Dept. TP New York 16, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1963

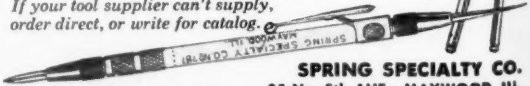
No. 676 SINGLE POINT $1.50



LEIGH Carbide SCRIBERS

Marks hardened steel, ceramics, plastics, gems, glass, etc. Polished aluminum body. Black-finish steel screw collets hold the points, easy to reverse for safety or adjust for length. Carbide point is ¼" diameter carbide rod approximately ½" long, copper-brazed into steel, ground to a point, and hand-polished, CAN BE RESHARPENED MANY TIMES. Steel point is hardened, and centerless ground to a long taper.

If your tool supplier can't supply, order direct, or write for catalog.



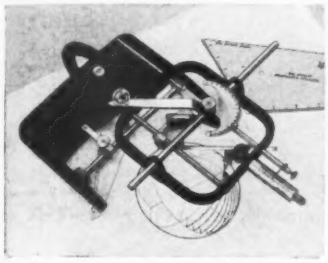
No. 787 DOUBLE POINT $2.50

SPRING SPECIALTY CO.
25 No. 5th AVE., MAYWOOD, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1964

Circular Drawing Machine Eliminates Long Calculations

A new drawing machine enables technical illustrators and draftsmen to make accurate pictorial drawings in less time than it takes to make plan view drawings. Because of its speed and convenience of operation, it makes pictorial drawing economically practicable.



Photos courtesy of Charles Bruning Co., Inc.

This machine draws precise ellipses, spirals, helixes, and arcs in a matter of seconds. A completely universal compass eliminates time consuming calculations otherwise required to plot these shapes.

Two simple settings—one to establish the major diameter, the other the minor diameter—enable the user to draw mathematically precise ellipses in any ratio by degrees or from points on a drawing. Repeated and related ellipses on the same axis are achieved through the instrument's rolling parallel action—a feature which makes the machine especially valuable for use in making exploded views.

The average draftsman, engineer, or technical illustrator can master its use in just a few minutes.

Complementary to the circular drawing machine in function is a new five-piece template set for use in technical illustration work. The set provides a uniform, positive system for determining dimensions of lines and angles in pictorial drawing without requiring involved projections, mathematical calculations, graphs, or special boards.

The templates enable draftsmen to draw views of an object from any angle with proportionately correct dimensions, in a fraction of the time it takes to make a plan view drawing.

In effect, the templates adapt the functions of basic orthographic drawing tools to pictorial drawing; hence their use is quickly grasped by any draftsman without special training.

DOES IT BETTER
DOES IT FASTER

SIMPLEX-M
ABRASIVE BAND GRINDER

The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING WRITE TODAY

WALLS SALES CORP.
333 Nassau Avenue, Brooklyn 22, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1972

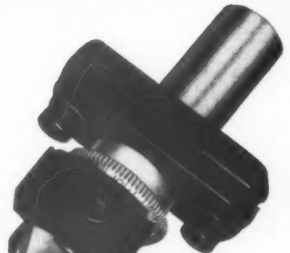
KUTMORE ADJUSTABLE HOLLOW MILLS

A MIGHTY MIDGET!

This Midget Floating Holder Hollow Mill, flange type, has micrometric adjustment, and is designed to permit easy compensation for any spindle misalignment. Small, sturdy, extremely accurate!

WRITE TODAY FOR CATALOGUE No. 20-TD

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.



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CARL WIRTH & SON, INC. 1625 CLINTON AVE. NO. ROCHESTER 5, N. Y.

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Tomco

HAND WHEELS
HAND KNOBS
MACHINE HANDLES
HANDLES
BALL HANDLES
SPECIALTIES

Specify Tomco for long lasting dependability

A complete line of high grade hand knobs, handles, and hand wheels is available from Tomco. Immediate shipments are made from stock of standard items. Specialty items are made to your specifications.

For original equipment or replacement parts look to Tomco for quality and service.

Write for literature

Tomco PRODUCTS CO.
1623 DOUGLAS AVE.
RACINE, WISCONSIN

Blank or Machined—from stock

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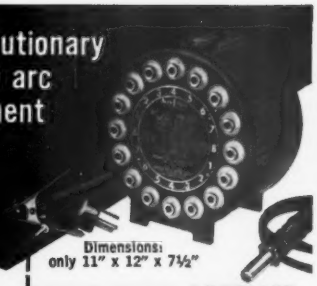
The most revolutionary achievement in arc welding equipment in years!



Patent Pending

Dimensions: only 11" x 12" x 7½"

BREN-WELD MODEL 200 AW

FIRST TRULY PORTABLE 200 AMP. OUTPUT ARC WELDER

Weighs only 65 lbs . . . Carry it to the job!

OBSOLETES ALL OTHER WELDERS OF COMPARABLE RATING

Sensational new transformer development produces far more power to pound! The BREN/WELD does work of conventional welders 4 or 5 times its size and weight . . . Actually delivers up to 250 amps at reduced duty cycle.

Simple to use, fully guaranteed, it operates on 110/220 volts AC, 50/60 cycles; handles electrodes from 3/64" to 5/32". Has adjustable arc voltage for different arc characteristics. Ideal for plant production and maintenance, for construction work, railroads, on farm or home.

List Price $169.50 F. O. B. Long Island City, N. Y.

See your dealer or write direct for details of free trial offer!

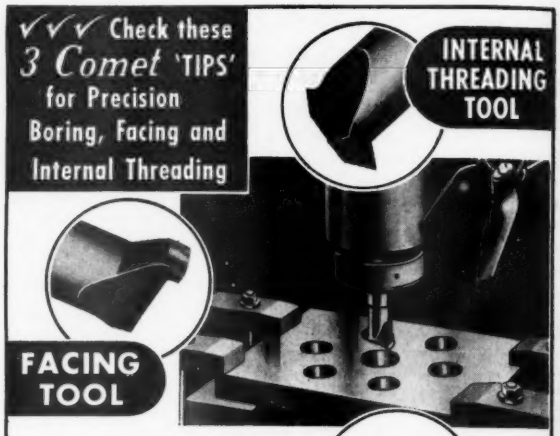
24 HOUR DELIVERY FROM STOCK!

Manufactured by BRENNEN, BUCCI & WEBER, INC. New York City

SALES DIVISION
KASSON DIE & MOTOR CORPORATION
Integrity Since 1919
32-14 NORTHERN BOULEVARD, LONG ISLAND CITY 1, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1981

✓✓✓ Check these 3 Comet 'TIPS' for Precision Boring, Facing and Internal Threading



Made of HIGH SPEED or CARBIDE

FOR HOLES FROM 1/16" UPWARD

17 DIFFERENT SIZES

- CONSTANT SHAPE & CLEARANCE
- FAST PERFORMANCE
- ECONOMY IN PRODUCTION
- EFFICIENT IN RESULTS
- EASY RESHARPENING
- CONVENIENT TO USE
- LONG LIFE
- INDISPENSABLE FOR PRECISION BORING OF SMALL HOLES

COMET offers "SOLID CARBIDE INSERT" BORING TOOLS

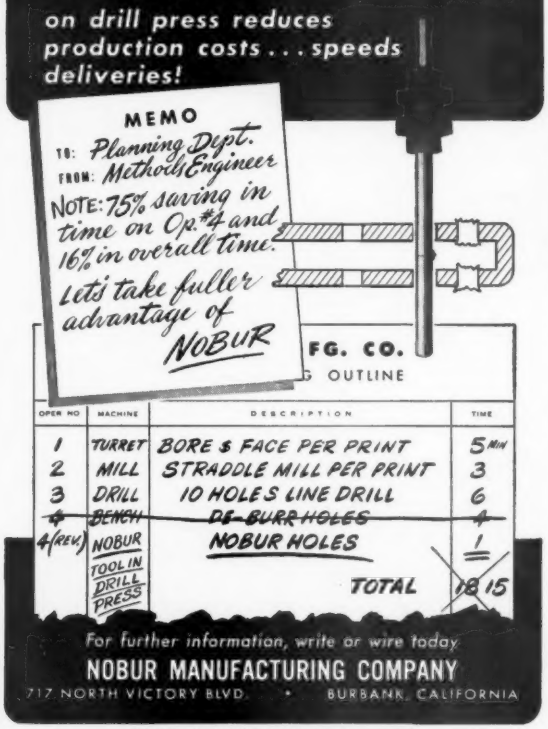
Made to Your Specifications

COMET Tool Co.

738-T BROADWAY • NEW YORK 3, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1982

Deburring with NOBUR tool on drill press reduces production costs . . . speeds deliveries!


MEMO
TO: Planning Dept.
FROM: Methods Engineer
NOTE: 75% saving in time on Op. #4 and 16% in overall time!
Let's take fuller advantage of NOBUR
FG. CO.
OUTLINE
OPER NO. | MACHINE | DESCRIPTION | TIME
1 | TURRET | BORE & FACE PER PRINT | 5 MIN
2 | MILL | STRADDLE MILL PER PRINT | 3
3 | DRILL | 10 HOLES LINE DRILL | 6
4 | BENCH | DE-BURR HOLES | 4
4 (REV.) | NOBUR TOOL IN DRILL PRESS | NOBUR HOLES | 1
TOTAL 18 15

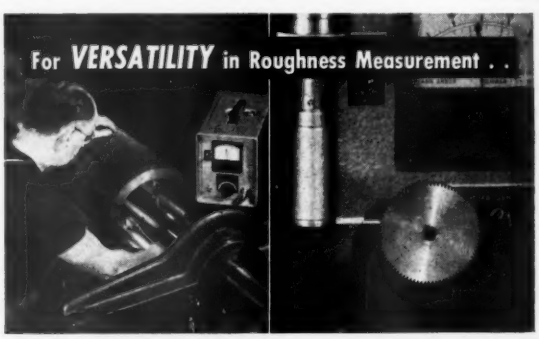
For further information, write or wire today.

NOBUR MANUFACTURING COMPANY

717 NORTH VICTORY BLVD. • BURBANK, CALIFORNIA

CIRCLE INFORM-A-GRAM KEY NO. 1983

For VERSATILITY in Roughness Measurement . .



The PROFILOMETER®

With the Profilometer, you can quickly measure the microinch roughness of ID's of *any* size from 5/64" to flat — OD's of *any* size from 1/32" to flat, and from .010" to *several feet* in length — gear teeth as small as 48 D. P. — internal grooves and tapers — ½" holes to 24" depth — and practically *all other* surfaces.

The Profilometer is rugged, portable, and simple to use. Factory-calibrated for dependability. Used world-wide, in thousands of plants . . . since 1936.

FREE BULLETIN LT89 gives details; describes cost-saving applications. Write!

Profilometer is a registered trade mark.

MMC MICROMETRICAL MANUFACTURING COMPANY

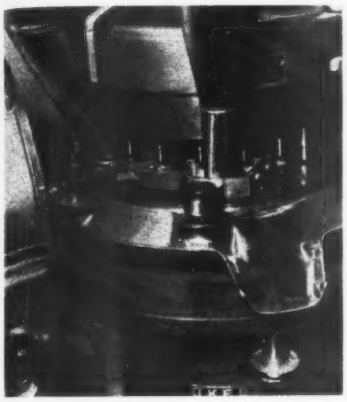
339 S. MAIN ST. ANN ARBOR, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1984

MULTI-LAYER PARTS COMPACTED ON NEW ROTARY PRESS

New industrial design possibilities are opened up by a new rotary press which can compact tablets of from one to three layers, each of different materials.

Virtually any combination of materials can be compacted together so long as they will adhere after sintering or firing. The separate layers can be of any thickness desired, within the total



thickness-capacity of the press, and the ratio of thickness of one layer to another can vary from 1:1 up to 1:3.

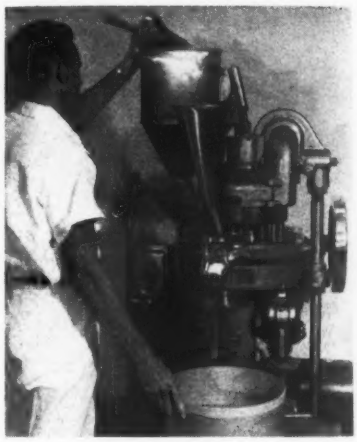
The press, developed by F. J. Stokes Machine Company, is already being used for a number of industrial applications. For example:

1. To provide a base material which is more workable than the substance which forms the principal element. (Example: Alnico permanent magnets, which are compacted from metal powders, are extremely hard and almost impossible to drill or tap. Attaching these magnets to any supporting structure thus presents a problem. A solution lies in making a two-layer table — the upper layer of Alnico composition, the lower of powdered iron. After sintering, the iron layer is easily tapped to secure the magnet in place.)

2. To conserve expensive materials by supporting them on a base of less costly material. (Example: Bi-metallic electrical contacts can be made with a relatively thin contact layer of silver-tungsten and a thicker base layer of copper.)

3. To combine a soft, conductive element and a wear resisting element in one component. (The only limitation on the choice of materials for such an application is that they must adhere firmly to each other after sintering.)

4. To support a layer of relatively fragile material on a stronger backing material. (Example: Brake inserts can be made with a layer of friction material compacted simultaneously with a layer of a metallic backing material, such as iron. The metal layer would then serve to attach the insert to the brake plate or drum by brazing.)



No decrease in the rate of production of the press is required by reason of the multi-layer filling operations. Somewhat closer supervision is recommended, however, to obtain the best operating results. Particular attention must be given to see that the dies are set up uniformly level. and that the powder scrapers are operating properly.

TEN-SPINDLE AUTOMATIC NUT-SETTER

A machine which will automatically set 10 bolts on a V-8 automobile engine cylinder block has been designed, manufactured and delivered to a major automobile manufacturer by the Cleco Division of the Reed Roller Bit Company.

The device, a 10-spindle electro-pneumatic nut-setter, is fully automatic and requires no oper-

. . . *Continued on page 198.2*

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THE Lakeside Steel Improvement Co.

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CIRCLE INFORM-A-GRAM KEY NO. 1985

. . . Ten-Spindle, from page 198.1

ators. The nut running unit is powered by 10 air motors and is self-supported by a steel framework which straddles the assembly line conveyor. With a capacity of 2000 bolts/hr, the machine is a complete unit package requiring only the hooking up of electric and air connections to be put into immediate service.

Engine cylinder blocks travel toward the nut-runner on the conveyor, which never stops during the nut-setting process, while the nut running unit slides downward on its framework guides at a corresponding pace with the block. As the block reaches the machine, it is centered by fences and rollers, and then triggers the mechanism into motion. The nut running unit lowers and is accurately positioned by pilot pins which fit into holes in the cylinder block. The nut-runners, powered by 10 air motors, set the bolts, automatically cutting off when stalled at torque.

After the proper time has elapsed, a switch shuts off air to the motors, which are bled of air to relieve pressure on the sockets, and the overhead cylinder withdraws and returns the unit to the starting position in time for the next cylinder block.

In the initial contact, if the pilot pins do not find the seating holes true, triggers set in the pin nose actuate a control mechanism to withdraw the unit from

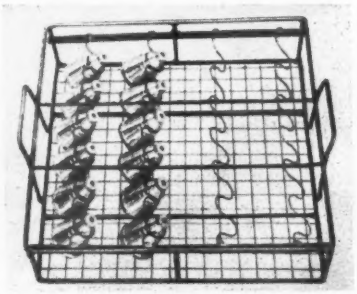
that particular cylinder block. As no manpower is needed to supervise the machinery in operation, and if trouble occurs, a safety mechanism disengages connections, stops the conveyor, and sets off an air horn and colored lights to summon help.

Degreasing Basket Also Serves for Work Transfer

A combination container to serve as a degreasing basket and, at the same time, as a work transfer receptacle for handling aluminum bomb fuse heads was needed by The Bulova Watch Company.

The problem was solved by Wiretex Manufacturing Co. who developed a basket with carrying handles made of a steel frame mesh. Replaceable aluminum-wire holders are rigidly fastened into place and shaped to hold the fuse heads in such a way as to keep them from touching each other or any other part of the basket.

In the production process, 24



fuse heads at a time are carried from the primary operation to degreasing and then through the sequence of secondary operations. Despite all of the handling and transportation, the basket prevents any scratching or denting of these thin-walled, close-tolerance parts.

After final operation, the empty baskets are easily stacked in a minimum of space.

"Price Tags" Spur Better Care of Machines and Tools

By "price-tagging" all production equipment and tools Clark Equipment Company's Industrial Truck Division found that pro-

duction workers had more respect for their machines and tools. Men were more careful when they realized that a machine cost $22,000, or that reamers cost as much as $18.72 each.

As a direct result of this cost educational program, Clark's tool breakage expenses at its Battle Creek plant, has been reduced by 20% and there have been substantially less machine downtime for maintenance and repair.

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CLEVELAND 3, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1986

. . . Carbide Surfaces, from page 80

reason that it is extremely important to know, in setting up specifications, just how much of this polishing and lapping is actually required for a specific job.

There are many other methods for obtaining fine finishes. In one instance, a 1000-grit diamond wheel having 25% concentration of diamonds is being used very successfully in grinding direct to the finished size with no polishing or lapping required. To accomplish this, however, it would be necessary to have diamond grinding wheels of coarser grits which would lead up to the 1000-grit finish grind. For example, it would probably be necessary after the 400-grit grind in the above example to use a 600- or 800-grit wheel, or both, before the 1000-grit wheel could be used successfully. In these very fine wheels, there is actually no stock removal of any significance involved; it is merely a method of polishing and refining.

The use of the wood laps in the carbide roll, cited above, is also applicable for flat surface work. A very typical application is the polishing of carbide surfaces using a wood lap as shown in Figure 1. Here the grinding, polishing, and lapping operations are very similar to those described for the roll operation except that the work is done on a flat surface. It is not essential that wood laps be used since many individuals doing this type of work have different preferences. There are cases where individuals claim excellent results from cast iron, steel, fiber, and even wax laps. These are all factors to be decided by application, but for most carbide polishing the wood lap is the most easily adapted and usually the least expensive. It is known that maple wood is most satisfactory.

For those who have a large volume of lapping and polishing to be done, the super-finishing machines on the market today can be readily adapted to any of the carbides by the simple expedience of changing from silicon carbide or aluminum oxide honing stones to diamonds. This, of course, requires a large quantity of pieces and must be justified on this basis in order to be economical.

The real problem that confronts the supplier of carbide parts is that of determining just what is actually needed by the customer in the way of finishes. Until such time as an industry standard can be established, it would seem advantageous to all buyers of carbide tools and parts to look into the problem of specifications and determine whether or not they are paying for finishes and polishes that are not required for their particular application and, even more important, whether an improvement in these specifications might result in better performance and lower cost to them.

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CORISA LUMBER FOR PATTERN-MAKING

Corisa wood has been found to be an excellent pattern-making material. It is native to South America and is now available to the pattern-making industry in the United States.

Corisa wood is somewhat lighter than pine, but equally strong. Being free of pitch it holds its shape much better than pine, remaining dimensionally stable under adverse conditions even in thin shell sections. A large percentage of the lumber carried in stock is quarter-sawn, which contributes considerably to its stability.

Its workability is excellent, being easy to plane and sand with the grain or across the end grain; carves well; takes coatings readily; and presents an outstanding finished appearance.

Corisa is graded according to National Hardwood Association rules—the same as those governing the grading of mahogany. It is stocked in thicknesses varying from 1″ to 3″.

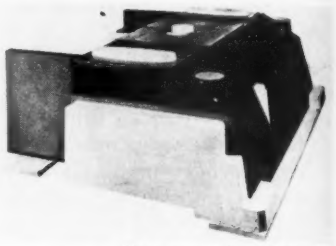
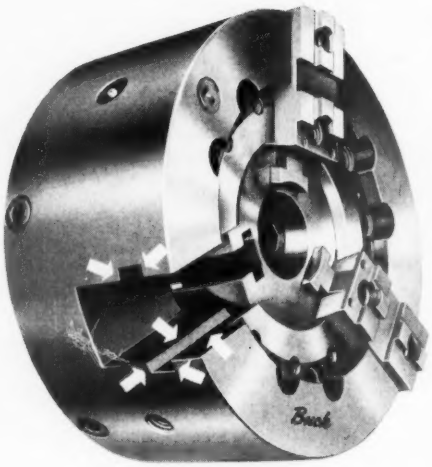


Photo courtesy Kindt-Collins Co.

Now Hardened Key Ways in Buck AIR CHUCKS



New Standard Feature Added to .001″ Precision Ajust-Tru Chucks

Longer wear, longer accuracy — thanks to hardened key ways — is now added to other unique features of Buck Air Chucks. *At no extra cost!*

Now, more than ever, you'll want to consider *all* of the ways the Buck can save you money.

Guaranteed .001″ precision. *Jaws can be machined in the tool room,* saving the time-wasting trial and error method *and down time* of fitting on the chucking machines.

Hardened jaws can be used for all operations with the Buck, and jobs run intermittently *without the need to re-true the jaws* for each set up.

Final accuracy adjustments can be made under full air pressure. And for safety, the Buck keeps its gripping power should the air line break.

6″, 8″, 10″ and 12″ sizes — 2 or 3 jaws — NO PRICE PREMIUM.

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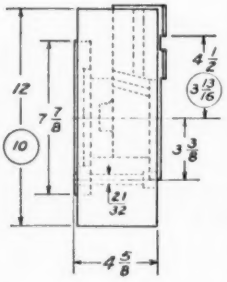


Principal dimensions on the 10″ and 12″ chuck mounted to an A1-8″ American Standard Spindle Nose.

CIRCLED DIMENSIONS FOR 10″ DIAMETER CHUCK.

Buck AJUST-TRU CHUCKS

The Buck Ajust-Tru principle is a unique chuck development.

Jaws grip work like any other scroll or air chuck. After work is gripped opposed screws near the back of the chuck are used to move the chuck on the adapter to bring work to dead true alignment. No further adjustment needed to chuck duplicate parts.

On hand-operated chucks jaws always come back to within .0005″ — on air chucks to within .001″.

Buck TOOL CO.
218 SCHIPPERS LANE
KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 2001

MOVABLE VACUUM PUMP INTRODUCED

The VacForm Mobile Pump Wagon can be utilized as production needs dictate, at numerous spots within a single plant.

The vacuum pump unit is contained within a metal cabinet with removable panels, mounted on a heavy steel frame with a swing-back top-door for opening convenience. It has rubber-tired, ball-bearing wheels on swivel casters to permit travel from place to place by one man without strain.

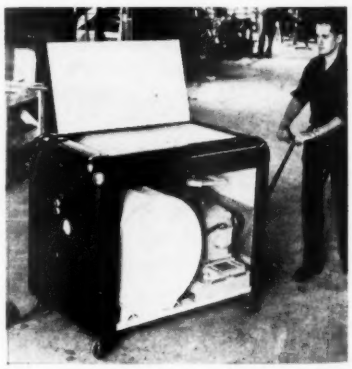
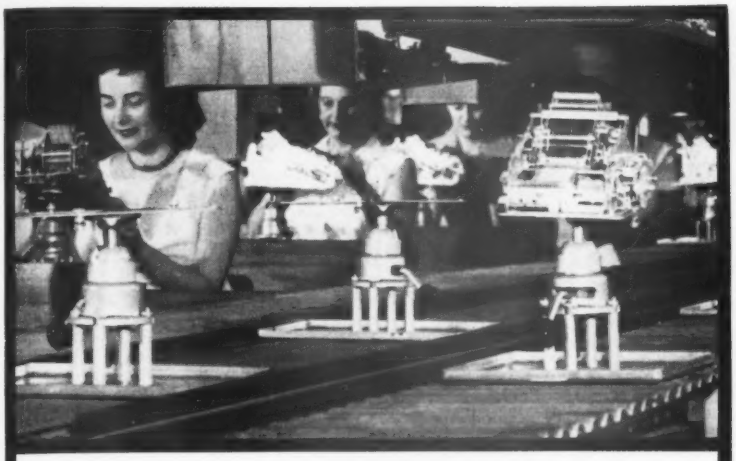


Photo courtesy Vacuum Forming Co.

Among the processes for which the mobile unit is suitable are the vacuum and drape forming of rigid plastics, and bag molding, such as used with laminated and reinforced plastics.

The unit weighs 900 lbs, is 3½′ high, and requires only 4′ by 2½′ of floor space. It includes an air-cooled rotary pump with automatic lubrication, a vacuum gage, and an adjustable vacuum shut-off switch. The vacuum potential at sea-level is 29½″.



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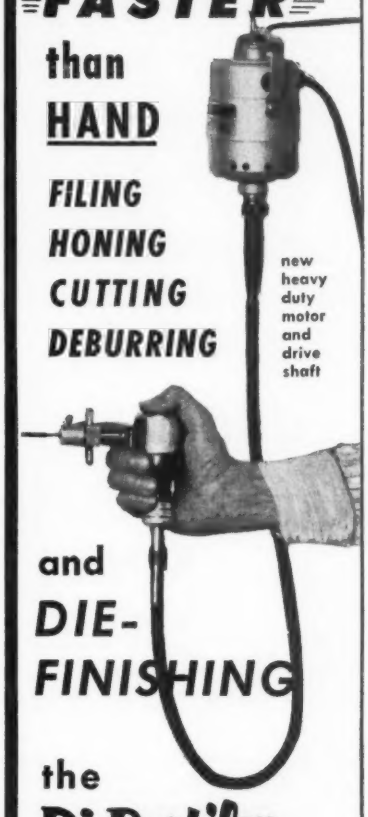

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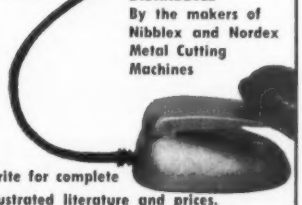

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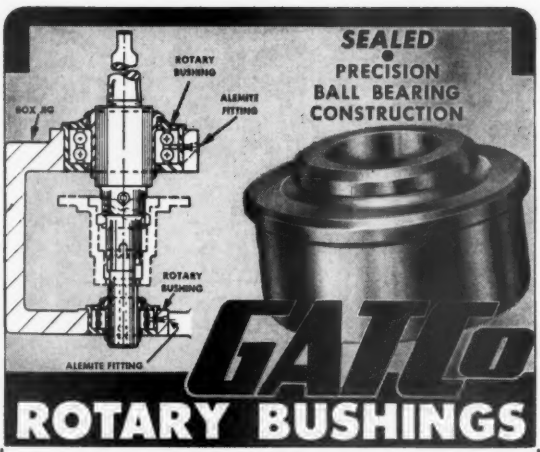

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CIRCLE INFORM-A-GRAM KEY NO. 2021

. . . Flash Trimming, from page 98

as tool changing required 10 to 15 minutes. This also meant keeping a good supply of tools handy for the changes.

In shifting over to a special carbide for the operation, both tool life and production jumped. But Bissell engineers still were concerned over costs of the special carbide tool. They also felt the special tool was too much tool for the small diameter tubing, yet it was

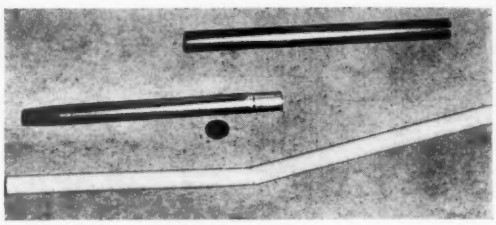

Fig. 3. Steel tubing produced by Bissel on which tool costs were cut by making use of a standard Carboloy tool. By selecting proper grade for this particular job company increased production 10%.

expedient to use a carbide that both provided wear and heat resistance, since its cutting edge traveled across the tubing 50 to 60 fpm, making a continuous hot cut.

A suggestion from a Carboloy engineer checking the job solved the problem. Today, by using a standard grade 370 carbide tool, the company is producing more tubing between tool regrinds than ever before, with a minimum of shutdowns.

In a specific run, for example, the Carboloy grade 370 carbide tool trimmed 13,000′ of tubing against 11,400′ for the previous special carbide. As the daily output of the tubing mill is 12,500′, it now enables the company to use one tool for an entire daily run — using a freshly ground tool at the beginning of each day's operation. Furthermore, tool inventory is no longer a problem.

The Carboloy grade 370 carbide tools are purchased by Bissell in the form of ¾″ x ¾″ standard, off-the-shelf tools. These are ground to provide an effective angle of 5° end relief, 2° back rake and a radius suitable for the size tubing being processed.

Improved Guide Pin Ends Locking Problems

The improved removable cap guide pins by Superior Steel Products Corp. eliminate punch holder binding in separating die sets by allowing greater freedom of movement where they are most apt to tilt and bind. A socket head screw which rotates in a collar and serves as a jack holds the cap in place.

The structure of the pins provide for replacement of only the cap when pins wear because of long press runs. Available as standard equipment on the company's two and four post die sets, the pins are made in sizes from 1¼″ dia.

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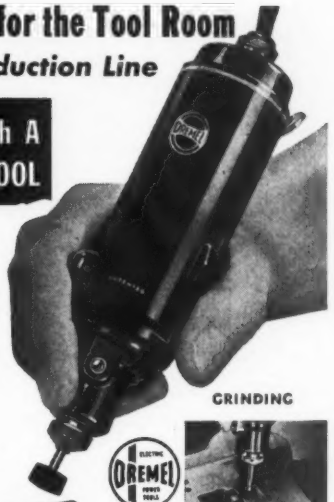

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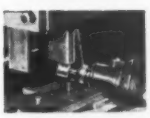
SHARPENING



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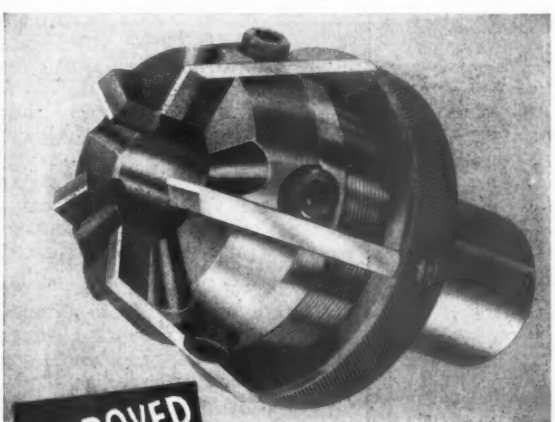

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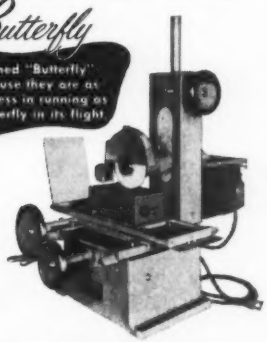

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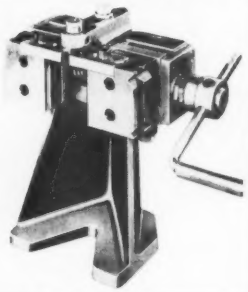

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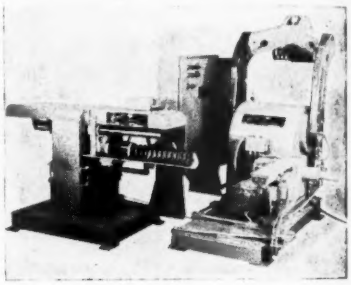

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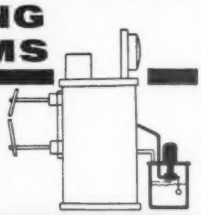

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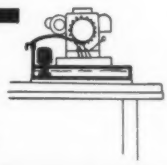

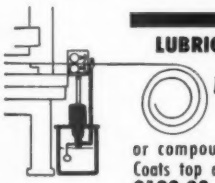

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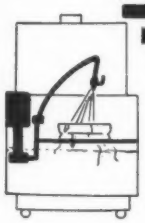

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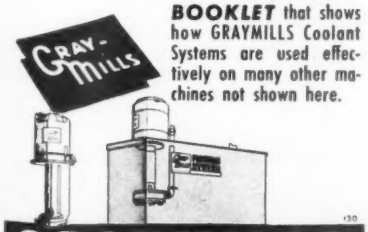

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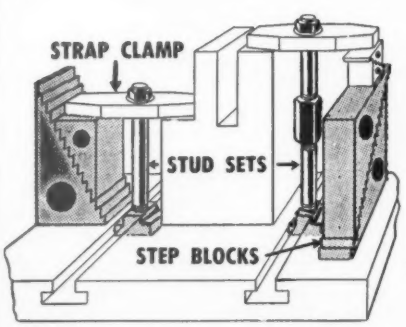

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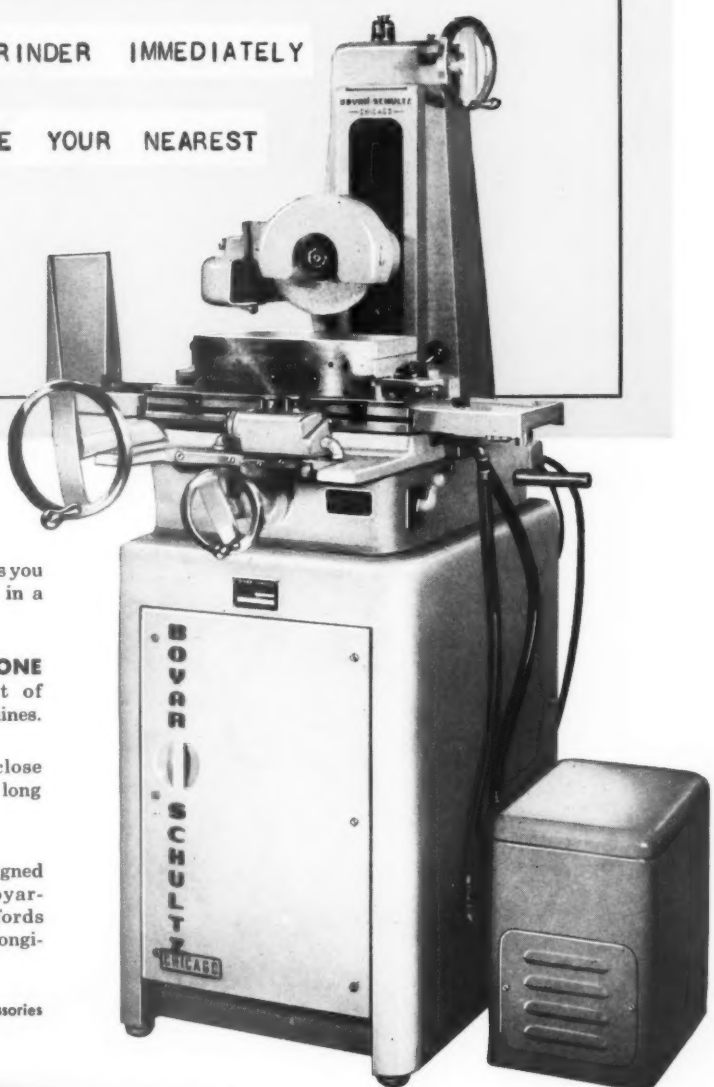

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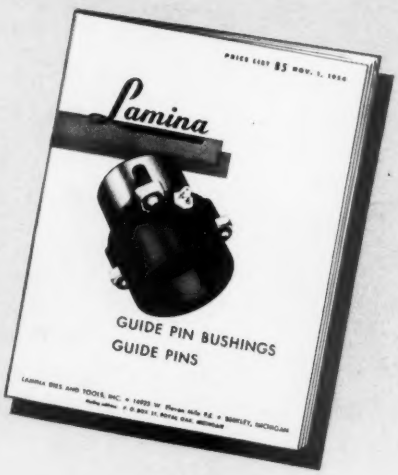

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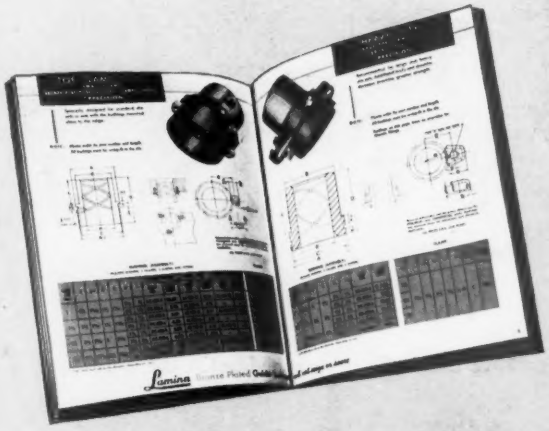

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